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A Revision of the North American Species of Buprestid Beetles Belonging to the Tribe Chrysobothrini

By

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By W. S. Fisher,[1] *entomologist, Division of Insect Identification, Bureau of Entomology and Plant Quarantine*

CONTENTS

	Page
Introduction	1
Classification	2
Tribe Chrysobothrini Stein	2
Description of the tribe	4
Key to the genera	4
Genus *Actenodes* Dejean	4
Description of the genus	4
Key to the species of *Actenodes*	5
Notes and records by species	6
Classification—Continued.	Page
Genus *Chrysobothris* Eschscholtz	17
Description of the genus	17
Key to the species of *Chrysobothris*	20
Notes and records by species	30
Unrecognized and fossil species	249
Literature cited	250
Illustrations (figs. 110–126)	252
Index	269
Index to host plants	271

INTRODUCTION

The present publication is the result of several years' study of *Actenodes* and *Chrysobothris* and comprises all the species of these genera found in the mainland of America, north of Mexico, but including Lower California, the fauna of which is very similar to that of the desert regions of the Southwestern States.

The task of revising these genera was undertaken because the genus *Chrysobothris* is an important one economically, and, although many species have been described during the past 50 years, no revisional study has been made of the North American species since 1886.

[1] The writer expresses his acknowledgments to those who in some special way have given aid in the preparation of this paper. He is especially indebted to E. T. Cresson, Jr., of the Academy of Natural Sciences of Philadelphia; P. J. Darlington, Jr., of the Museum of Comparative Zoology; J. N. Knull, of the University of Ohio; W. J. Chamberlin, of the Oregon State Agricultural College; Edwin C. Van Dyke and Mont. A. Cazier, of the University of California; Edward S. Ross, of the California Academy of Sciences; C. A. Frost, Framingham, Mass.; and the late H. C. Fall, Tyngsboro, Mass., for permission to examine types in their custody. For the loan of valuable material the writer is indebted to the following entomologists and collectors: E. G. Linsley, University of California; Donald de Leon, Fort Collins, Colo.; Howard Notman, Staten Island, N. Y.; William Procter, Bar Harbor, Maine; W. F. Barr, Oakland, Calif.; T. H. Frison, Illinois Natural History Survey; F. P. Keen, Portland, Oreg.; W. W. Baker, Puyallup, Wash.; J. M. Miller, Berkeley, Calif.; Jacques R. Helfer, Casper, Calif.; Raymond Roberts and Myron H. Swenk, University of Nebraska; H. B. Hungerford, University of Kansas; R. C. Cassellberry, Landsdowne, Pa.; Ernest Shoemaker, Brooklyn, N. Y.; Hugo G. Rodeck, University of Colorado; and L. C. Merriam, Yosemite National Park, Calif.

All the drawings of male genitalia were made by Eleanor T. Carlin, of the Bureau of Entomology and Plant Quarantine, and the writer expresses here his appreciation of her careful work.

Owing to the close resemblance to one another of many of the species, the published records on distribution and host plants are in the considerable part incorrect, and the species are badly confused in most collections. Clearing this confusion will materially aid those concerned with the control of economically important species.

The types, or specimens compared with the types, have been examined of all the described species found in North America except those that have been lost or are deposited in European collections. Seven species of *Actenodes* and 115 species of *Chrysobothris* are treated in this publication, of which 7 species are described as new. Four fossil species and 3 other species, which are unrecognized or listed as *Chrysobothris* but belong to other genera, are omitted from the key, but these are briefly treated at the end of the publication. Owing to the great variation in the size of the beetles in the tribe Chrysobothrini, the drawings were made to the same scale.

CLASSIFICATION

Tribe Chrysobothrini Stein[2]

Chrysobothrini Stein, 1868, Cat. Coleopt. Europae, p. 63 (not seen); Reitter, 1870, Naturf. Ver. in Brünn, Verhandl. 8 (2): 99–100; Stein and Weise, 1877, Cat. Coleopt. Europae, ed. 2, p. 90; Kerremans, 1893, Soc. Ent. de Belg. Compt. Rend. 37: 111–112, fig. 1; 1902, *in* Wytsman, Genera Insect., fasc. 12, pt. 1, pp. 5–6, 1903, fasc. 12, pt. 3, p. 181; 1906, Monog. Buprestides, v. 1, pp. 38, 50; Fisher, 1925, U. S. Natl. Mus. Proc. 65 (9): 5; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 571–572.

Chrysobothridae Castelnau and Gory, 1836–1837, Monog. Buprestides, v. 2, p. 1.

Chrysobothrides Duponchel, 1843, *in* d'Orbigny, Dict. Univ. Hist. Nat., v. 3, p. 650; Lacordaire, 1857, Genera Coléopt., v. 4, pp. 34, 70–76.

Chrysobothres LeConte, 1861, Smithsn. Inst. Misc. Collect. 3 (3): 153–154; LeConte and Horn, 1883, Smithsn. Inst. Misc. Collect. 507: 197–198.

Linnaeus (*10, p. 408*) established the genus *Buprestis* on 19 species, of which *chrysostigma* is No. 7. This genus remained undivided until Fabricius (*5, p. 218*) established the genus *Trachys* for 11 species. Up to 1800 there were at least 250 species described in the genus *Buprestis*, besides 43 species of *Carabus* and *Cicindela* placed by Geoffroy (*6, p. 141*) in that genus.

Geoffroy (*6, p. 123*), not liking the name used by Linnaeus, proposed *Cucujus* for *Buprestis* and included 6 species, of which *chrysostigma* (Linnaeus No. 7) is the first, and used the name *Buprestis* for *Carabus* and *Cicindela* of Linnaeus, including 43 species, some of which were unnamed, although these were given names by Fourcroy in 1785.

Latreille (*9, p. 426*) designated *Buprestis chrysostigma* Fabricius 1775 (who cited *chrysostigma* Linnaeus 1758) as the type of *Buprestis*.

Eschscholtz (*4, p. 9*) established the genus *Chrysobotris* (original spelling), including *Buprestis impressa*, *B. chrysostigma*, and *B. affinis*, all congeneric, and the genus *Ancylochira*, including *B. flavomaculata*, *B. strigosa*, *B. 8-guttata*, *B. punctata*, *B. cupreus*, *B. haemorrhoidalis*, and *B. rustica*.

Gistel (*7, p. 10*) established the genus *Amblis* and included *Buprestis chrysostigma* F., *B. affinis* F., and *B. nobilis* (*?*) F.

[2] The citations to the literature are not complete, only a few of the more important ones dealing with the North American fauna being listed.

Kirby (*8, p. 156*) established *Odontomus* as a subgenus of *Buprestis* and designated *Buprestis chrysostigma* Linnaeus as the type, and *Anoplis* as a subgenus of *Buprestis*, designating the type as *Buprestis rustica* Linnaeus.

Westwood (*11, p. 24*) designated *Buprestis chrysostigma* Linnaeus as the type of *Chrysobothris* Eschscholtz, and *B. rustica* Linnaeus as the type of *Ancylochira* Eschscholtz.

Duponchel (*3, p. 737*) cited *Buprestis chrysostigma* Fabricius as the type of *Chrysobothris* Eschscholtz.

Des Gozis (*2, p. 20*), not knowing of the above type designations, published the following synonymy:

1. *Buprestis* L. 1758 (syn. *Ancylocheira* Esch. 1829) (type: *octoguttata* L.).
2. *Cucujus* Geoffr. 1762 (syn. *Chrysobothrys* Esch. 1829) (type: *chrysostigma* L.).

He also proposed the new name *Porphyrus* for *Cucujus* Fabricius 1775 (not Geoffroy 1762).

Chamberlin (*1, p. 136*) designated the genotype of *Chrysobothris* Eschscholtz as *Buprestis affinis* Fabricius.

If we should observe the strict application of the law of priorty the results would be as follows:

Buprestini Mequingnon 1939 (not Kerremans 1893).
Syn. *Chrysobothrini* auct.
Buprestis Linnaeus 1758.
Type: *Buprestis chrysostigma* F. [1775].
Designated by Latreille, 1810.
Syn. *Chrysobothris* Eschscholtz 1829.
Type: *Buprestis chrysostigma* L. 1758.
Designated by Westwood, 1840.
Syn. *Cucujus* Geoffroy 1762 (not Fabricius 1775).
Type: *Buprestis chrysostigma* L. 1758.
Designated by Des Gozis, 1886.
Syn. *Amblis* Gistel 1834.
Includes *Buprestis chrysostigma* F. [1775].
Syn. *Odontomus* Kirby 1837.
Type: *Buprestis chrysostigma* L. 1758.
Original designation.
Ancylochirini Mequingnon 1939.
Syn. *Buprestini* auct.
Ancylochira Eschscholtz 1829.
Type: *Buprestis rustica* L. 1758.
Designated by Westwood, 1840.
Syn. *Buprestis* auct.
(Not as restricted by Linnaeus.)
Syn. *Anoplis* Kirby 1837.
Type: *Buprestis rustica* L. 1758.
Original designation.

There are over 500 valid species (not including synonyms) in the genus *Chrysobothris*, which are distributed throughout the entire world, and if these were referred back to the genus *Buprestis* many of the names would become secondary homonyms and would require new specific names. It is the writer's opinion that on account of the wide distribution and great number of species, and an unbroken history of constant universal usage for over 100 years, and since a change of name at this late date would cause greater confusion than uniformity, the International Commission on Zoological Nomenclature will be requested to place *Chrysobothris* Eschscholtz, with *Buprestis chrysostigma* Linnaeus as type, and *Buprestis* Linnaeus, with *B. octoguttata* Linnaeus as type, on the official List of Generic Names under suspension of the rules.

Description of the Tribe

Front of head narrowed at the antennae, which are inserted on the front at a considerable distance from the eyes, in rounded cavities in oblique depressions. Antenna with third segment distinctly longer than fourth, the sensory pores concentrated in foveae at external margin of segments. Mentum corneous at base, membranous at apex. Eyes oblique, strongly converging toward occiput. Each elytron rounded or angulated at base, covering base of pronotum, which thus seems lobed. Scutellum triangular, or elongate and strongly acuminate at apex. Sternal cavity formed at bottom by metasternum, and at sides by mesosternum; metasternal epimeron partially covered by lateral prolongations of abdomen. Prosternal process acutely angulated on each side behind coxa, and also acute at apex. Mesosternum large, narrowly divided. Posterior coxa broader internally; anterior margin straight or sinuate; posterior margin oblique. Anterior femur toothed or unarmed.

Key to the Genera

Third segment of tarsus prolonged on each side into a long, divergent spine, which extends beyond fourth segment----------*Actenodes* Dejean, p. 4.
Third segment of tarsus truncate at apex, not extending beyond fourth segment----------*Chrysobothris* Eschscholtz, p. 17.

Genus Actenodes Dejean

Actenodes Dejean, 1833, Cat. Coléopt., ed. 2, p. 80; 1836, ed. 3, p. 90; Lacordaire, 1857, Genera Coléopt., v. 4, pp. 72–73; LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 240–241; Gemminger and Harold, 1869, Cat. Coléopt., v. 5, pp. 1420–1421; Quedenfeldt, 1886, Berlin. Ent. Ztschr. 30: 11–14; Kerremans, 1890, Soc. Ent. de Belg. Compt. Rend. 34: cxxxiii–cxxxvii; 1892, Soc. Ent. de Belg. Mém. 1: 200–203; 1903, *in* Wytsman, Genera Insect., fasc. 12, pp. 193–195; Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 209; Blatchley, 1910, Coleoptera of Indiana, pp. 779, 792; Leng, 1920, Cat. Coleopt. North Amer., p. 183; Fisher, 1925, U. S. Natl. Mus. Proc. 65 (9): 83–91; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 41–44; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 659–667.

Chrysobothris Castelnau and Gory, 1836–1837, Monog. Buprestides, v. 2, 59 pp., illus. (part).

Belionota Chevrolat (not Eschscholtz), 1833–1835, Coléopt. du Mex. (pages not numbered); Motschulsky, 1859, Soc. Imp. Nat. Moscou Bul. 32 (2): 184–185.

DESCRIPTION OF THE GENUS

Head vertical; front flat or slightly convex, sides strongly converging from bottom to occiput; clypeus short, more or less emarginate or subtruncate in front, frequently with a median tooth; antennal cavities rather large. Antenna rather short, variable, usually more or less serrate from fourth segment, the serrate segments armed with poriferous foveae on their lower anterior margins, sometimes also with obsolete foveae on upper surface. Eyes very large, elliptical, much closer to each other on occiput than at bottom. Pronotum much wider than long, not closely applied to elytra at posterior angles; anterior margin broadly, arcuately emarginate; sides variable; base sinuate, usually with a more or less distinct median lobe. Scutellum small, triangular. Elytra variable, scabrous or punctate, with or without costae, lobed at base, attenuate posteriorly, sides serrate posteriorly. Sternal cavity formed by mesosternum and metasternum; mesosternum divided, lateral branches elongate and somewhat triangular; metasternum slightly emarginate or truncate in front. Prosternum more or less convex on each side anteriorly; anterior margin truncate or slightly sinuate; prosternal process flat, strongly constricted by coxal cavities, behind which it is abruptly expanded on each side into a sharp tooth, and with a large, acute tooth at apex, which fits into the sternal cavity.

Legs rather robust, anterior and middle femora more or less swollen, the former armed on inner margin with a large, acutely triangular tooth, which is not serrate on outer margin; tibiae normal, anterior pair frequently arcuate; tarsi rather short, third segment of each deeply emarginate and divided into two long, divergent spines which extend beyond fourth segment; tarsal claws simple or slightly expanded at base. Body elongate, rather broad, more strongly attenuate posteriorly than anteriorly.

Genotype.—Buprestis nobilis Fabricius.

Actenodes is a rather large genus and is widely distributed, the species being distributed throughout North, Central, and South America, Mexico, the West Indies, and Africa. It is closely allied to *Chrysobothris* and *Colobogaster*, but can be easily distinguished from either of these two genera by having the third segment of the tarsus armed with two long spines, which extend beyond the fourth segment. The generic characters given above apply only to the American species. The African species placed in this genus may not be congeneric.

The name *Actenodes* was first used by Dejean (1833) in his Catalogue des Coléoptères, in which he included *nobilis* Fabricius and nine species of which no descriptions had been published. In his third edition of the same work (1836) he gives, in addition to the ones previously listed, *viridifasciata*, *calcarata*, and *chalybeitarsis*, all from Mexico and credited to Chevrolat, of which *viridifasciata* seems to be a manuscript name. Lacordaire (1857) published a description of the genus, in which he placed a number of species, some of which were previously included in the genus by Dejean. *Buprestis nobilis* Fabricius is the only originally included species which is available as the genotype. The genotype designation for *Actenodes* Lacordaire by Chamberlin (1926) as *Chrysobothris chalybeitarsis* (Chevrolat) is invalid, since Lacordaire credits the genus to Dejean (1933), where *chalybeitarsis* is not one of the included species.

KEY TO THE SPECIES OF ACTENODES

1. Elytra with green or cupreous spots or fasciae 2
   Elytra without green or cupreous spots or fasciae 4
2. Elytra with more or less distinct, transverse, zigzag, greenish or cupreous fasciae 3
   Elytra with distinct, round, green or cupreous spots ..... (1) *auronotata* (Castelnau and Gory), p. 6.
3. Posterior angles of pronotum converging ..... (2) *flexicaulis* Schaeffer, p. 8.
   Posterior angles of pronotum diverging ..... (3) *calcarata* (Chevrolat), p. 9.
4. Eyes separated from each other on occiput by about their own width at widest part ..... (4) *mendax* Horn, p. 11.
   Eyes separated from each other on occiput by one-half or less their own width at widest part 5
5. Elytra even ..... (5) *arizonica* Knull, p. 12.
   Elytra uneven 6
6. Fourth segment of antenna strongly triangular, at widest part nearly twice as wide as third, and the following segments transverse ..... (6) *acornis* (Say), p. 13.
   Fourth segment of antenna slightly triangular, slightly wider than third, the following segments not transverse ..... (7) *simi* Fisher, p. 15.

NOTES AND RECORDS BY SPECIES

(1) Actenodes auronotata (Castelnau and Gory)

(Fig. 110, *A*)

Actenodes bellula Dejean (not Mannerheim), 1833, Cat. Coléopt., ed. 2, p. 80; 1936, ed. 3, p. 90 (no description): Gemminger and Harold, 1869, Cat. Coléopt., v. 5, p. 1421 (part); Kerremans, 1892, Soc. Ent. de Belg. Mem. 1:200 (part); Champlain and Knull, 1922, Canad. Ent. 54: 102; Obenberger, 1934, *in* Junk (pub.), Cat. Coléopt., pt. 132, p. 661 (part).

Chrysobothris auronotata Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, p. 20; Jacquelin-Duval, 1857, *in* Ramon de la Sagra, Hist. Phys. Polit. et Nat. de l'Ile de Cuba [pt. 2, Hist. Nat.], French ed., p. 64, pl. 7, fig. 8. (Spanish ed., v. 7, p. 29, v. 8, pl. 7, fig. 8.)

Chrysobothris auronota Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, pl. 4, fig. 30, addenda p. 6 (error on plate,=*auronotata*).

Actenodes bella LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 240–241; 1863, Smithsn. Inst. Misc. Collect. 140: 43; Gemminger and Harold, 1869, Cat. Coléopt., v. 5, p. 1420.

Actenodes auronotata Chevrolat, 1867, Soc. Ent. de France Ann. (ser. 4) 7: 584 (reprint, p. 160); LeConte, 1873, Acad. Nat. Sci. Phila. Proc. [25] 332; Schwarz, 1878, Amer. Phil. Soc. Proc. 17: 451; Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 209; Wenzel, 1906, Ent. News 17: 38; Dozier, 1918, Ent. News 29: 331; Fisher, 1925, U. S. Natl. Mus. Proc. 65 (9): 88–90; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 42–43 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 660–661.

Buprestis auriguttata Sturm, 1826, Cat. Insecten-Sammlung, p. 104 (no description).

Chrysobothris auriguttata Sturm, 1843, Cat. Käfer Sammlung, p. 61 (no description,=*auronota* Castelnau and Gory).

Male.—Broadly elongate, rather strongly convex above, subopaque, dark brown, with faint cupreous and bronzy reflections, the scutellum bright green, and the elytra ornamented with golden-green spots; beneath dark brown, with distinct bronzy-green and cupreous tinges, and strongly shining.

Head uniformly dark brown, vaguely cupreous, with a narrow, smooth, longitudinal carina on occiput and vertex; front slightly convex; surface glabrous, coarsely, densely, deeply ocellate-punctate, the punctures more or less contiguous between antennal cavities, the intervals finely granulose; clypeus sinuately truncate in front. Eyes nearly contiguous on top of head. Antenna bronzy green on basal segments, greenish black on apical segments, slightly narrowed to apex; outer segments compact, twice as wide as long, broadly rounded at outer margins; third segment as long as the following two segments united.

Pronotum twice as wide as long, narrower at apex than at base, widest at base; sides arcuately converging at apical angles, slightly sinuate and obliquely diverging from apical fourth to posterior angles, which are slightly expanded; base transversely sinuate on each side, with a broadly rounded median lobe; disk moderately convex, with a narrow, shallow, transverse depression behind middle, surface coarsely, densely, deeply, uniformly punctate, more or less rugose at sides, intervals densely granulose.

Elytra at base distinctly wider than pronotum, nearly twice as long as wide; sides parallel from humeral angles to middle, then arcuately converging to tips, which are conjointly broadly rounded; basal depressions broad, shallow; humeral depressions indistinct; surface glabrous, finely, densely, uniformly punctate, finely, transversely rugose, intervals (except on golden-green spots) densely granulose, and each elytron ornamented with a golden-green or coppery color as follows: A narrow vitta along sutural margin behind scutellum and near apex; a similar vitta along lateral margin posteriorly and at humeral angles; and with four large, round, not impressed spots, one at base, one on disk in front of middle, one at lateral margin in front of middle, and one on disk just behind middle.

Abdomen beneath finely, sparsely, shallowly, irregularly punctate, vaguely, longitudinally rugose, glabrous, intervals indistinctly granulose, and the three apical sternites with a rather wide, transverse, smooth space along anterior margins; last visible sternite broadly truncate at apex, with a small tooth at each exterior angle; eighth tergite broadly rounded at apex, sparsely, coarsely

punctate, and longitudinally carinate basally. Prosternum coarsely, densely, deeply punctate, slightly rugose anteriorly, glabrous, and gibbose on each side along anterior margin, which is truncate. Anterior and middle tibiae with a number of very small teeth on their inner margins, the former arcuate and slightly expanded near apex.

Length 14 mm., width 6.5 mm.

Redescribed (except for the antennae, which are missing) from the male type of *bella*, No. 2710, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—There are scarcely any external differences between the sexes of this species, but the females are usually more robust, the last visible abdominal sternite is more transversely sinuate at the apex, and the tibiae are unarmed on their inner margins.

Type locality.—Of *auronotata*, "Cuba"; type supposed to be in the collection of René Oberthür. Of *bella*, Liberty County, Ga.; type in the Museum of Comparative Zoology (simply labeled with an orange disk).

DISTRIBUTION

From material examined:

FLORIDA: Lake Worth, June 4, 1887; Biscayne, May 27 (Hubbard and Schwarz). Fort Capron, April 1887; Marathron, March 8, 1919 (E. A. Schwarz). Orlando, July 15, 1927 (O. C. McBride). Gainesville, 1915. Orange County, June 17 (C. Nelson).
GEORGIA: Savannah (Hubbard and Schwarz). Liberty County.
CUBA: Throughout the island.

Also recorded in the literature by Champlain and Knull (1922) from Paradise Key, Fla., and by Chamberlin (1926) from Key West, Miami, and Elliott Key, Fla., and Tybee Island, Ga.

Hosts.—Champlain and Knull (1922) record an adult cut from dead baldcypress (*Taxodium distichum* (Linnaeus) Richard), and state that the adults were abundant on fire-killed "*Lysiloma latisiliqua*" at Paradise Key, Fla. Specimens in the collection are labeled as taken from the dry wood of "*Cajanus indicus*" by O. C. McBride at Orlando, Fla.

Very little variation was observed in the examples examined except in size, the length ranging from 10 to 15 mm.

This species is closely allied to *bellula* Mannerheim found in Santo Domingo, and the name is confused in the literature with that species, but *bellula* differs from *auronotata* in having the elytra more acuminate posteriorly, the surface more finely punctured, with the four discal spots distinctly embossed, brighter green, and narrowly margined with a golden-cupreous color.

Dejean (1833 and 1836) lists *bellula* from Cuba with *bellula* var. *sobrina* Mannerheim from Santo Domingo as a synonym, without giving any description. *Actenodes bellula* var. *sobrina* as used by Dejean is a manuscript name, but Mannerheim (1837), under the name of *bellula*, gives a description of the *A. bellula* var. *sobrina* Mannerheim listed by Dejean in his catalogues from the island of Santo Domingo, and writes, "Not possessing the real *Actenodes bellula* Dejean, I have been obliged to describe the variety." Since no description had been published under the name *bellula*, this name must be applied to the species described by Mannerheim from Santo Domingo, and *sobrina* Mannerheim must be placed as a synonym of that species. Castelnau and Gory (1837) described the species listed

by Dejean from Cuba as *auronota*, but this was changed to *auronotata* in their addenda (p. 6). LeConte (1859) described the same species from a single specimen from Liberty County, Ga., under the name *bella*. Gemminger and Harold (1869) have erroneously placed this species as a synonym of *bellula* Mannerheim, and some of the later writers have followed them in this. *Buprestis auriguttata* was listed by Sturm (1926) from Cayenne without description, but later (1843) he placed it as a synonym of *auronota* Castelnau and Gory from Cuba.

(2) Actenodes flexicaulis Schaeffer

(Fig. 110, *B*)

Actenodes flexicaulis Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 209; Leng, 1920, Cat. Coleopt. North Amer., p. 183; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 44; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 662.

Female.—Elongate, moderately depressed above, rather strongly shining, purplish black, with a distinct bronzy-green tinge, and each elytron ornamented with bright green as follows: A transverse basal fascia, a narrow, transversely oblique, irregular, zigzag fascia at basal third extending from lateral margin to sutural margin, and narrowly margined posteriorly with red; a slightly broader, transversely oblique fascia behind middle, extending from lateral margin to first costa, and narrowly margined anteriorly with red; a small, round spot along sutural margin at apical fourth, spot red in front, and connected by a narrow, longitudinal, red line to postmedian fascia; and lateral margin narrowly margined with green along apical third. Beneath bronzy or greenish black, with a purplish reflection in different lights, and more strongly shining than above.

Head uniformly dark olive green, slightly purplish, with a narrow, longitudinal, sulcate carina on occiput, and an indistinct chevron on vertex; front moderately convex, slightly uneven; surface glabrous, coarsely, irregularly, confluently punctate, coarsely asperate behind clypeus; clypeus truncate in front, with a short, broad tooth at middle. Antenna bronzy green, with outer segments purplish, nearly equal in width to apex; intermediate segments compact, wider than long, broadly rounded at outer margins, and each with a short, erect hair; third segment nearly as long as the following two segments united. Eyes narrowly separated on occiput.

Pronotum nearly twice as wide as long, slightly narrower at apex than at base, widest along middle; sides slightly, arcuately converging at base and apex, nearly parallel at middle, posterior angles obtuse; base transversely sinuate, without a median lobe; disk broadly, transversely depressed behind middle; surface densely, finely granulose, coarsely, irregularly punctate at middle, confluently and more coarsely punctate at sides.

Elytra at base wider than pronotum, widest just behind middle, nearly twice as long as wide; sides slightly diverging to behind middle, then arcuately converging to tips, which are separately acutely rounded; basal depressions broad, transverse, and rather deep; surface glabrous, finely, densely granulose, finely, rather densely scabrous. Each elytron with a broad, shallow depression in front of middle, and four slightly elevated, sinuate, longitudinal costae, first extending from base to near apex, where it is joined to the third, second extending from near base to apical fourth, third extending from near humeral angle to apex, and fourth following outline of lateral margin.

Abdomen beneath sparsely punctate, punctures elongate and very shallow, sparsely clothed with short, inconspicuous hairs; basal sternites shallowly, longitudinally concave; last visible sternite truncate at apex; eighth tergite strongly, longitudinally carinate at middle, broadly rounded at apex. Prosternum nearly glabrous, coarsely, densely punctate posteriorly, transversely rugose anteriorly; anterior margin truncate. Tibiae straight or slightly sinuate, unarmed on inner margins.

Length 10.25 mm., width 4.5 mm.

Redescribed from one of the two female cotypes in the United States National Museum, collected on the Esperanza Ranch, Brownsville, Tex., June 20, by Charles Schaeffer. This specimen is designated as the lectotype.

Male.—Similar to the female in external characters.

Type locality.—Esperanza Ranch, Brownsville, Tex.

DISTRIBUTION

From material examined:

TEXAS: Brownsville (Esperanza Ranch) (Charles Schaeffer). Brownsville, June 10, 1924 (J. N. Knull).

Also recorded in the literature by Schaeffer from San Tomas, Brownsville, Tex.

Host.—The larval habits are unknown, but the adults have been taken in small numbers at the type locality from the branches of Texas ebony (*Pithecellobium flexicaule* (Bentham) Coulter) by Charles Schaeffer, who writes that no specimens were taken on any other trees. This tree was formerly known as *Acacia flexicaule* Bentham. Chamberlin (1926) states that the larva works in *Acacia flexicaule*, but this may be a misstatement of Schaeffer's note in the original description.

No variation worthy of note has been observed in the three examples (two females and one male), except in size, which ranges from 9 to 10.25 mm.

This species resembles *calcarata* Chevrolat, but it differs from that species in being smaller and more slender, and in having the zigzag fascia on the elytra bright green, the posterior angles of the pronotum converging, and the underside of the body greenish. The writer has been unable to find any external characters for separating the sexes.

(3) ACTENODES CALCARATA (Chevrolat)

(Fig. 110, *C*)

Actenodes ziczac Dejean, 1833, Cat. Coléopt., ed. 2, p. 80; 1836, ed. 3, p. 90, as *zigzag* (no description).

Belionota calcarata Chevrolat, 1835, Coléopt. du Mex., cent. 2, fasc. 5, No. 103.

Actenodes calcarata Dejean, 1836, Cat., Coléopt., ed. 3, p. 90; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1421; Horn, 1875, Amer. Ent. Soc. Trans. 5: 148; Schwarz, 1878, Amer. Phil. Soc. Proc. 17: 451 (this is *acornis* Say); LeConte, 1878, Amer. Phil. Soc. Proc. 17: 470 (part); Waterhouse, 1882, Biol. Cent.-Amer., Coleopt. 3, pt. 1, p. 31; 1889, idem, p. 182; Horn, 1891, Amer. Ent. Soc. Trans. 18: 46; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 200; Wickham, 1898, Iowa Univ. Lab. Nat. Hist. Bul. 4: 305; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 118; Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 209; Burke, 1918, Jour. Econ. Ent. 11: 211; Fisher, 1925, U. S. Natl. Mus. Proc. 65 (9): 84; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 43 (part); Knull, 1927, Ent. News 38: 116; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 661–662.

Chrysobothris (Actenodes) fulgurata Mannerheim, 1837, Soc. Imp. Nat. Moscou Bul. 10 (8): 80–81; Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, pp. 29–30, pl. 6, fig. 42, addenda p. 6.

Chrysobothris lebasi Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, p. 30, pl. 6, fig. 43.

Male.—Moderately elongate, slightly convex above, shining, bronzy black, with a faint cupreous reflection, and the elytra ornamented with obsolete, transverse, zigzag, cupreous fasciae; beneath bronzy brown, with a distinct cupreous tinge, and more strongly shining than above; tarsi bluish black.

Head uniformly brownish cupreous, with a narrow, longitudinal carina on occiput, the carina slightly bifurcate anteriorly, and with two irregular, elongate, smooth spaces on the vertex; front slightly convex, shallowly, broadly, longitudinally depressed at middle; surface coarsely, irregularly, deeply punctate, coarsely scabrous behind clypeus, the intervals finely granulose; clypeus sinuate in front, with a vague median tooth. Eyes separated from each other on the occiput by less than half their width. Antenna short, piceous, with a faint cupreous tinge, narrowed to apex; intermediate segments compact, slightly wider than long, broadly rounded at outer margins, and each with a long whitish hair; third segment slightly longer than the following two segments united.

Pronotum nearly twice as wide as long, narrower at apex than at base, widest at base; sides arcuately diverging from anterior angles to posterior angles, these obliquely prolonged; base slightly emarginate on each side, the median lobe slightly produced and broadly rounded; disk moderately convex, narrowly, transversely depressed at basal third, with a distinct, oblique carina at the posterior angles; surface coarsely, deeply, irregularly punctate, coarsely rugose at sides, with a longitudinal, smooth, median space, and the intervals finely granulose.

Elytra distinctly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to middle (vaguely constricted in front of middle), then arcuately converging to the tips, which are separately acutely angulated; disk moderately convex, vaguely depressed in front of middle, with vague basal and humeral depressions; surface glabrous, densely, finely punctate, more or less rugose basally and at sides; each elytron with four vague, sinuate, longitudinal costae, the costae more obsolete posteriorly, and with a cupreous spot at base, and two obsolete, transverse, zigzag, cupreous fasciae, these with more or less distinctly greenish margins.

Abdomen beneath sparsely, finely fossulate-punctate, with fine, transverse, sinuate lines on basal sternites, nearly glabrous, the intervals finely granulose; last visible sternite broadly truncate at apex, with the angles slightly produced; eighth tergite broadly rounded at apex, longitudinally carinate at middle, lateral margins elevated posteriorly, the surface finely punctate, densely granulose, and sparsely clothed with long, erect, black hairs. Prosternum glabrous, sparsely, coarsely punctate, slightly rugose anteriorly; anterior margin truncate. Anterior tibia feebly arcuate, the middle and posterior tibiae straight, and all tibiae armed with a number of small teeth on their inner margins.

Length 17 mm., width 7.5 mm.

Female.—Similar to the male but differing from it in having the tibiae unarmed on their inner margins.

Redescribed from a male and female in the United States National Museum, collected in copula on huisache at Victoria, Tex., July 27, 1915, by J. D. Mitchell.

Type locality.—Of *calcarata*, near Zimapan Mines, Mexico; type in British Museum. Of *fulgurata*, "Mexico"; type supposed to be in the Zoological Museum of the University of Helsingfors. Of *lebasi*, Cartagena, Colombia; type supposed to be in the René Oberthür collection.

DISTRIBUTION

From material examined:

ARIZONA: Tucson, August 12–24 (H. F. Wickham). Bill Williams Fork, August (F. H. Snow and E. G. Smyth). Sabino Canyon, October (G. Hofer). Phoenix (Mason collection).

TEXAS: Brownsville, June (H. F. Wickham). Victoria, July 27, 1915 (J. D. Mitchell). Cameron County, September. Kingsville, January 1921, reared (J. C. Bridwell).

MEXICO: Chacoj, Vera Paz (C. O. Waterhouse). Pureza, Vera Cruz, October 20, 1935 (J. Camelog).

Also recorded in the literature as follows:

ARIZONA: Yuma (Wickham 1898). Florence (Chamberlin 1926).
CALIFORNIA: Desert region of southeast (Fall 1901).

COLOMBIA: Carthagena (type *lebasi*).
GUATEMALA: Chacoj, Panzos, and Yzabel (Waterhouse 1882, 1889).
NICARAGUA: Chontales (Waterhouse 1882).
MEXICO: Matamoros (Chamberlin 1926). Zimapan, Oaxaca; Orizaba, Jalapa, and Misantla in Vera Cruz, and Cuernavaca in Morelos (Waterhouse 1882, 1889).

Schwarz (1878) and LeConte (1878) record this species from Florida, but all Florida records should be referred to *acornis* Say.

Hosts.—Burke (1918) records the larvae mining the sapwood and heartwood of dying and dead palo-verde (*Cercidium torreyanum* (Watson) Sargent) and probably "bacchata" (*Zizyphus obtusifolia*). Chamberlin (1926) records it from peach, white oak, and hickory, but these records should be referred to *Chrysobothris calcarata* Melsheimer (not Chevrolat), which is a synonym of *Chrysobothris floricola* Gory. Adults have been cut from huisache (*Acacia farnesiana* (Linnaeus) Willdenow) and collected on horsebean (*Parkinsonia* sp.).

This species is rather uniform in coloration, but the cupreous fasciae on the elytra are more distinct on some specimens than on others. In some specimens examined the sides of the pronotum are less divergent posteriorly, the median smooth space on the pronotum obsolete, and the transverse depression variable in depth. The underside of the abdomen is foveolate-punctate in a few of the specimens studied. The clypeus is usually sinuate, with a small median tooth, but in a male from Arizona the anterior margin of the clypeus is slightly, arcuately emarginate, without any indications of a median tooth. The length is from 12 to 17 mm.

(4) ACTENODES MENDAX Horn

(FIG. 110, *D*)

Actenodes mendax Horn, 1891, Amer. Ent. Soc. Trans. 18: 46–47; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 118; Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 209; Woodworth, 1913, Guide to California Insects, p. 195; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 44; Knull, 1927, Ent. News 38: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 664.

Male.—Rather broadly elongate, slightly convex above, subopaque, bronzy green, with a distinct purplish tinge; beneath olivaceous green, with distinct purplish reflections in different lights, and more strongly shining than above.

Head bronzy green, distinctly cupreous in different lights, with an inconspicuous longitudinal carina on occiput, and a short, oblique, elevated carina on each side above the antenna; front flat; surface glabrous, finely, sparsely punctate on occiput, densely fossulate-punctate on vertex, and coarsely foveolate-punctate or rugose on front; clypeus sinuate in front. Antenna short, bronzy green, with a faint cupreous tinge, gradually narrowed to apex; intermediate segments compact, subtriangular, as long as wide, broadly rounded at outer margins; third segment one-third longer than the fourth. Eyes separated from each other on the occiput by about their width at widest part.

Pronotum twice as wide as long, distinctly wider at base than at apex, widest near base; sides slightly, arcuately converging from base to apex; posterior angles rectangular; base transversely sinuate on each side, the median lobe slightly produced and broadly rounded; disk regularly convex, with an obscure, oblique carina at the posterior angles; surface densely, finely granulose, finely, densely, transversely rugose, finely, punctate between the rugae.

Elytra slightly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to apical third, then obliquely converging to the tips, which are conjointly broadly rounded; disk regularly convex, with vague, longitudinal costae, but without basal or humeral depressions; surface glabrous, densely, finely, uniformly scabrous, slightly rugose basally.

Abdomen beneath nearly glabrous, densely, finely granulose, sparsely, finely, indistinctly punctate, with fine, transversely sinuate lines; last visible sternite broadly, shallowly, arcuately emarginate at apex. Prosternum glabrous, coarsely, transversely rugose; anterior margin truncate. Anterior tibia slightly arcuate; middle and posterior tibiae straight; all tibiae armed with a number of small teeth on inner margins.

Length 14.5 mm., width 6 mm.

Redescribed from the the male lectotype, No. 3501, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the front of the head uniformly piceous, the last visible sternite truncate at the apex, and the anterior tibia unarmed on the inner margin.

Type locality.—Texas, no definite locality.

DISTRIBUTION

From material examined:

ARIZONA: No definite locality.
TEXAS: Point Isabel, July (H. F. Wickham). Brownsville, May 28, 1938. Midland, September 19, 1912 (Rehn and Hebard).
MEXICO: Reynosa, May 20, 1895.

Chamberlin (1926) records it from California; Yuma, Ariz.; and New Braunfels, Tex. The one mentioned by him from Prescott, Ariz., in the Mason collection, is *arizonica* Knull.

Host.—Adults have been cut from dry mesquite (*Prosopis juliflora* (Swartz) De Candolle).

Very little variation was observed in the specimens examined, but in one of the paratypes from Texas the sides of the pronotum are arcuately constricted behind the middle. The length is from 14.5 to 19 mm.

Chamberlin (1926) gives the type locality as Fort Yuma, Ariz., but Horn in his original description states that it is known from Texas to Fort Yuma, and the designated lectotype is from Texas. Paratype No. 2, from Arizona in the Horn collection, is *arizonica* Knull. The specimen mentioned by Horn from Illinois is without a head and is probably mislabeled as to locality.

(5) ACTENODES ARIZONICA Knull

(FIG. 110, *E*)

Actenodes arizonica Knull, 1927, Ent. News 38: 115–116; Leng and Mutchler, 1933, Cat. Coleopt. North Amer., sups. 2–3, p. 29.

Female.—Rather broadly elongate, slightly convex above, subopaque, bronzy green, with a faint purplish tinge; beneath purplish brown, with a faint bronzy-green reflection, and more strongly shining than above.

Head piceous, with a purplish and bronzy tinge in different lights, and with a narrow, longitudinal carina on occiput, and an obscure chevron on vertex; front slightly convex; surface glabrous, densely, coarsely, deeply punctate on occiput, more coarsely, confluently punctate and more or less rugose on the front; clypeus truncate in front, with a rounded tooth at middle; eyes separated from each other on the occiput by less than half their width at widest part. Antenna short, uniformly piceous, subequal in width to apex; intermediate segments compact, wider than long, broadly rounded at outer margins; third segment nearly as long as the following two segments united.

Pronotum twice as wide as long, slightly wider at base than at apex, widest near base; sides slightly, arcuately converging from near base to apical angles, sinuate near base; posterior angles rectangular; base transversely sinuate on each

side, the median lobe slightly produced and broadly rounded; disk moderately convex, shallowly, broadly, transversely depressed behind the middle, with an obscure, oblique carina at posterior angles; surface densely, deeply foveolate-punctate, with a more or less distinct, interrupted, longitudinal, smooth, median space.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides parallel from humeral angles to apical third, then obliquely converging to the tips, which are conjointly broadly rounded; lateral margins coarsely serrate; disk regularly convex, shallowly, transversely depressed at base, but without longitudinal costae; surface glabrous, finely, densely scabrous, and more or less transversely rugose.

Abdomen beneath nearly glabrous, finely, densely granulose, sparsely, deeply reticulate, with anterior margins of sternites impunctate; last visible sternite broadly truncate at apex, with a short, acute tooth at outer angles. Prosternum nearly glabrous, coarsely, densely punctate, more or less rugose; anterior margin truncate. Tibiae straight, unarmed on inner margins.

Length 16 mm., width 6 mm.

Redescribed from the female holotype in the collection of J. N. Knull.

Male.—Differing from the female in having the head bright green behind the clypeus, and the posterior tibia armed with a number of very small teeth on the inner margin.

Type locality.—Tucson, Ariz.

DISTRIBUTION

From material examined:

ARIZONA: Tucson, August 28, holotype. Santa Rita Mountains (D. K. Duncan). Prescott (Mason collection).
CALIFORNIA: Bard, July 30, 1920.

Host.—Unknown.

Scarcely any variation was observed in the few specimens examined, except that the median tooth on the anterior margin of the clypeus is absent in some specimens. The length is from 14 to 16 mm.

(6) ACTENODES ACORNIS (Say)

(Fig. 110, *F*)

Buprestis acornis Say, 1836, Amer. Phil. Soc. Trans. (n. s.) 6: 159–160; 1859, Complete Writings (LeConte ed.), v. 2, pp. 592–593; Ballière Bros. ed.
Chrysobothris acornis Melsheimer, 1853, Cat. Coleopt. U. S., p. 64.
Actenodes acornis LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 241; 1863, Smithsn. Inst. Misc. Collect. 140: 43; 1873, Acad. Nat. Sci. Phila. Proc. [25]: 332; Hubbard and Schwarz, 1878, Amer. Phil. Soc. Proc. 17: 656; Horn, 1886, Amer. Ent. Soc. Trans. 13: 118; Ulke, 1902, U. S. Natl. Mus. Proc. 25: 21; Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 209; Felt, 1906, N. Y. State Mus. Mem. 8 (2): 751; Smith, 1910, N. J. State Mus. Rpt. 1909: 293; Blatchley, 1910, Coleoptera of Indiana, p. 702; Woodworth, 1913, Guide to California Insects, p. 195 (identification?); Nicolay, 1919, Brooklyn Ent. Soc. Bul. 14: 19; Knull, 1920, Ent. News 31: 7; 1922, Canad. Ent. 54: 83; Good, 1925, Ent. Soc. Amer. Ann. 18: 262, 272, pl. 8, figs. 6, 12 (wing venation); Knull, 1925, Ohio State Univ. Studies 2 (2): 35–36, pl. 5, fig. 3; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 41–42; Leonard, 1928, N. Y. (Cornell) Agr. Expt. Sta. Mem. 101: 361; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 660; Brimley, 1938, Insects of North Carolina, p. 172.
Buprestis punctata Melsheimer, 1806, Cat. of Insects of Pennsylvania, p. 46 (no description).
Chrysobothris punctata Melsheimer, 1844, Acad. Nat. Sci. Phila. Proc. 2: 147; Melsheimer, 1853, Cat. Coleopt. U. S., p. 64.
Chrysobothris rugosula Dejean, 1833, Cat. Coléopt., ed. 2, p. 80; 1836, ed. 3, p. 90 (no description); Gory, 1840, Monog. Buprestides, sup. 4: 177, pl. 30, fig. 172.
(?) *Belionota californica* Motschulsky, 1859, Soc. Imp. Nat. Moscou Bul. 32 (2): 184–185, pl. 4, fig. 18; LeConte, 1863, Smithsn. Inst. Misc. Collect. 140: 43;

Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1420; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 118.

Chrysobothris californica Saunders (not LeConte), 1871, Cat. Buprestidarum, p. 97; Horn, 1886, Amer. Ent. Soc. Trans. 13: 118.

Female.—Moderately elongate, moderately convex above, rather strongly shining, dark bronzy green, with a faint cupreous reflection; beneath purplish brown, with a distinct bronzy-green tinge, and more strongly shining than above.

Head bronzy black, with a distinct purplish tinge, shallowly, broadly depressed on vertex, with a narrow, longitudinal carina on occiput, the carina bifurcate anteriorly; front slightly convex; surface glabrous, coarsely, deeply foveolate-punctate on front, more finely punctate on occiput; clypeus sinuate in front, with a broad, median tooth. Eyes separated from each other on the top by about one-fourth their width. Antenna short, purplish brown on basal segments, greenish black on apical segments; fourth segment strongly triangular, nearly twice as wide as the third; outer segments compact, strongly transverse, broadly rounded at outer margins, and each with a short, whitish hair; third segment as long as the following two segments united.

Pronotum twice as wide as long, narrower at apex than at base, widest at middle; sides slightly, arcuately rounded, more strongly toward apical angles, vaguely sinuate at posterior angles, which are nearly rectangular; base transversely sinuate on each side, the median lobe slightly produced and very broadly rounded; disk moderately convex, broadly, transversely depressed behind the middle, without distinct prehumeral carinae; surface glabrous, closely, deeply, transversely rugose, coarsely punctate between the rugae. Scutellum bright green.

Elytra distinctly wider than pronotum, twice as long as wide; sides parallel from humeral angles to middle, then strongly converging to the tips, which are separately, rather acutely angulated; basal depressions broad and shallow; surface slightly uneven, glabrous, densely, finely, uniformly scabrous.

Abdomen beneath glabrous, finely, sparsely punctate, transversely rugose at sides, smooth along anterior and posterior margins of sternites, the intervals obsoletely granulose; last visible sternite strongly depressed, broadly truncate at apex, with a strongly elevated, serrate, preapical ridge; eighth tergite broadly rounded at apex, slightly, longitudinally carinate at middle, lateral margins strongly elevated, the surface finely punctate, densely granulose, and sparsely clothed with long, erect, black hairs. Prosternum glabrous, densely, coarsely punctate, transversely rugose anteriorly; anterior margin truncate. Tibiae straight or slightly sinuate, unarmed on inner margins.

Length 14.5 mm., width 6 mm.

Redescribed from a female in the United States National Museum, collected in Lake County, Ind., June 17, 1903, by W. S. Blatchley, and donated to the Museum by J. J. Davis. Since the type of this species is lost, the writer is designating this specimen as the neotype.

Male.—Differing from the female in having the hairs on the antennal segments much longer, and the middle and posterior tibiae armed with a number of small teeth on their inner margins. The sexes are very much alike.

Type locality.—Of *acornis*, Indiana; type lost, neotype in the United States National Museum. Of *punctata*, Pennsylvania; type probably specimen No. 6 under *acornis* in the LeConte collection. Of *rugosula*, North America; present location of type unknown to writer. Of *californica*, "Nova-Helvetia," Calif. (present site of Sacramento); type supposed to be in the Moscow Museum.

Distribution.—Material has been examined from various localities in the following States: Florida, Indiana, Iowa, Louisiana, Michigan, New Jersey, New York, Ohio, Pennsylvania, Texas, and Virginia. Chamberlin (1926) also records the species from Kentucky and Wisconsin, Ulke (1902) from the District of Columbia, and Brimley (1938) from North Carolina.

Hosts.—Knull (1920, 1922) records rearing adults from dead wood of red maple (*Acer rubrum* Linnaeus), beech (*Fagus grandifolia*

Ehrhart), sweet birch (*Betula lenta* Linnaeus), hickory (*Hicoria* sp.), and black oak (*Quercus velutina* LaMarck). Smith (1900) records the species on pine, but this may not be a host tree.

The color on the dorsal surface of the body is more purplish on some specimens, the sides of the pronotum are either parallel or slightly rounded, the anterior margin of the clypeus is sometimes vaguely emarginate without a median tooth, and the teeth on the middle and posterior tibiae of some males are obsolete. The length is 9.5 to 15 mm.

Saunders (1871) misidentified *Belionota californica* Motschulsky and placed it as a synonym of *Chrysobothris californica* LeConte, both of which were described in 1859, but the writer is unable to find the exact date of publication of the descriptions of these two species. There is some doubt about the identification of *californica* Mots., but Horn (1886) states that it is *Actenodes acornis* Say. Motschulsky described the species as a *Belionota*, giving the locality as "Nova-Helvetia," Calif., which is the present site of the city of Sacramento. From the examination of the figure it seems to be an *Actenodes*, but no specimens of this genus are known from that locality, and *acornis* is not known from west of the Rocky Mountains. The early wagon trains crossing the Great Plains picked up insects along the way, and they were left with Mr. Sutter, who lived near the present site of Sacramento. These got into the hands of Vosneszensky, and thence to Moscow, where they were described by Motschulsky, Mannerheim, et al. On account of conditions in Europe, the writer has been unable to have specimens compared with the type of *californica* Mots. in the Moscow Museum.

LeConte (1873) placed *rugosula* Gory as a synonym of *acornis* after examining the type of *rugosula* in the collection of Count Mniszech in Paris.

Say's description of *acornis* was probably made from a male and Melsheimer's description of *punctata* from a female.

(7) Actenodes simi Fisher

Actenodes simi Fisher, 1940, Ent. Soc. Wash. Proc. 42: 176.

Male.—Moderately elongate, slightly convex above, slightly shining, bronzy black, with a faint cupreous or purplish reflection; beneath bluish black, with distinct greenish and violaceous tinges, and more strongly shining than above.

Head bluish green, slightly violaceous in front, cupreous on occiput, with a narrow longitudinal carina on occiput, the carina strongly bifurcate on vertex; front slightly convex; surface glabrous, coarsely, deeply foveolate-punctate on the front, more finely punctuate on occiput; clypeus transversely sinuate in front. Eyes separated from each other on the top by about one-fourth their width at widest part. Antenna bluish to greenish black, short, extending beyond vertex of head, slightly narrowed to apex, the first three segments together shorter than the following segments united; intermediate segments compact, as long as wide, broadly subtruncate at outer margins, and with a few long, whitish hairs; third segment as long as the following two segments united.

Pronotum twice as wide as long, narrower at apex than at base, widest at base; sides slightly, obliquely diverging from apical angles to posterior angles, which project outward and are broadly rounded; base transversely sinuate on each side, the median lobe broadly rounded; disk slightly convex, broadly, transversely depressed behind the middle, without distinct prehumeral carinae; surface glabrous, rather coarsely, transversely rugose, coarsely punctate between the rugae. Scutellum bronzy green.

Elytra distinctly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to middle, then arcuately converging to the tips, which are separately, rather acutely angulated; basal depressions broad and shallow; surface slightly uneven, glabrous, densely, finely, uniformly scabrous, finely, transversely rugose basally.

Abdomen beneath glabrous, rather coarsely, densely punctate, transversely rugose at sides and on basal segments, the intervals finely granulose; last visible sternite more or less depressed, broadly, transversely sinuate at apex, with a slightly elevated submarginal ridge; eighth tergite broadly rounded at apex, vaguely, longitudinally carinate at middle on basal half, lateral margins strongly elevated, and the surface coarsely, shallowly punctate, densely granulose, and sparsely clothed with long, erect, black hairs. Prosternum glabrous, densely, coarsely punctate, transversely rugose anteriorly; anterior margin truncate. Tibiae straight or slightly sinuate, the middle and posterior ones armed with a number of small teeth on their inner margins.

Female.—Differing from the male in having the front of the head uniformly purplish brown, the antenna cupreous, with a distinct bronzy-green tinge, and the hairs on the segments much shorter, the clypeus usually with a small tooth at middle, the middle and posterior tibiae unarmed on their inner margins, and the underside of the body bronzy green, with a distinct cupreous or purplish tinge.

Length 9.5–15 mm., width 3.75–6 mm.

Type locality.—Brigantine, N. J. Type in the United States National Museum.

DISTRIBUTION

From material examined:

IOWA: No definite locality.
MISSOURI: No definite locality.
NEW JERSEY: Brigantine, type (R. J. and M. B. Sim), Seaside Park (R. J. and M. B. Sim, and R. C. Casselberry). Ocean City (R. C. Casselberry). Asbury Park (H. A. Kaeber). Atlantic City (H. Soltau).
NEW YORK: Yaphank (Long Island) and near New York City.
PENNSYLVANIA: Harrisburg and Hummelstown (J. N. Knull).
RHODE ISLAND: Watch Hill (W. Robinson).
TEXAS: No definite locality.

Host.—Unknown.

The dorsal surface of the body is rather uniform in coloration, but the color on the scutellum varies from bronzy green to coppery brown, and on the head of the male from green to bluish green, sometimes with a distinct violaceous tinge. The longitudinal carina on the head is frequently not bifurcate anteriorly, and sometimes there is a more or less distinct, broad, crescent-shaped, smooth space below the vertex. The clypeus is usually sinuate in front, but rarely it is shallowly, arcuately emarginate. The antenna is variable in length, usually extending just beyond the anterior margin of the pronotum, but sometimes nearly to the base of the pronotum, especially in the males. The sides of the pronotum are either slightly rounded anteriorly and slightly constricted behind the middle, or converge from the anterior angles to the posterior angles, which project either outward or backward. The depressions on the pronotum are more or less variable in depth.

This species has been confused in collections with *acornis* Say, but it differs from that species in having the antenna longer, extending beyond the anterior margin of the pronotum, with the fourth segment only slightly triangular, and the outer segments not wider than long. The male genitalia are similar to those of *acornis*.

Genus Chrysobothris Eschscholtz

Chrysobotris Eschscholtz, 1829, Zool. Atlas, v. 1, p. 9 (separate, p. 8) ; Westwood, 1840, Introduct. Class. Insects, v. 2, sup., p. 24.

Chrysobothris Solier, 1833, Soc. Ent. de France Ann. 2: 310–311, pl. 12, fig. 29; Castelnau and Gory, 1836–1837, Monog. Buprestides, v. 2, *Chrysobothris*, pp. 1–59, pls. 1–10; Mannerheim, 1837, Soc. Imp. Nat. Moscow Bul. 10 (8) : 74–79; Gory, 1840, Monog. Buprestides, sup. 4, pp. 157–186, pls. 26–32; Duponchel, 1843, *in* d'Orbigny, Dict. Hist. Natl., v. 3, p. 650; Melsheimer, 1853, Cat. Coleopt. U. S., p. 64; Lacordaire, 1857, Genera des Coléopt., v. 4, pp. 71, 75–76; LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 229–240, 254–255; 1863, Smithsn. Inst. Misc. Collect. 140: 42–43; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, pp. 1423–1428; Saunders, 1871, Cat. Buprestidarum, pp. 94–101; Crotch, 1873, Check List Coleopt. North Amer., p. 64; Austin, 1880, Check List Coleopt. North Amer., sup., p. 27; Henshaw, 1885, List Coleopt. North Amer., pp. 73–74; Horn, 1886, Amer. Ent. Soc. Trans. 13: 65–125, pls. 2–7; Des Gozis, 1886, Rech. de l'espèce Typique . . . p. 20; Waterhouse, 1887–1889, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, pp. 35–48, 183–185, pl. 3, figs. 3–20, pl. 9, fig. 13; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 205–222; Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 368–369; Henshaw, 1895, List Coleopt. North Amer., sup. 3: 19–20; Kerremans, 1903, *in* Wytsman, Gen. Insectorum, fasc. 12, pp. 183–192; Fall, 1910, N. Y. Ent. Soc. Jour. 18: 45–52; Blatchley, 1910, Coleoptera of Indiana, pp. 779, 788–792, figs. 302–306; Leng, 1920, Cat. Coleopt. North Amer., pp. 182–183; Knull, 1925, Ohio State Univ. Studies 2 (2) : 27–35; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 136–177; Leng and Mutchler, 1927, Cat. Coleopt. North Amer., sup. 1, p. 30; 1933, sups. 2–3, p. 29; Chamberlin, 1934, Pan-Pacific Ent. 10: 35–42, figs. 1–28; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 576–658; Chamberlin, 1938, Pan-Pacific Ent. 14: 11; Keen, 1938, U. S. Dept. Agr. Misc. Pub. 273: 150; Mequignon, 1939, Soc. Ent. de France Bul. 44: 48–49; Blackwelder, 1939, Cat. Coleopt. North Amer., sup. 4, p. 43.

Amblis Gistel, 1834, Insecten Doubletten aus der Sammlung des Herrn Grafen Rudolph von Jenison Watworth, No. 1, Käfer, p. 10.

Buprestis (*Odontomus*) Kirby, 1837, *in* Richardson, Fauna Boreali-Amer., v. 4, pp. 156–158.

Enocys Gistel, 1856, Pandora Monacensis, p. 415 (publication not seen).

Knowltonia Fisher, 1935, Ent. Soc. Wash. Proc. 37: 117–118 (new synonymy).

The bibliography given above for the genus is not complete, as only the more important articles are cited, and especially those dealing with the American species. In the above papers by Melsheimer (1853), Lacordaire (1857), LeConte (1863), Gemminger and Harold (1869), Saunders (1871), Crotch (1873), Austin (1880), Henshaw (1885, 1895), Kerremans (1892, 1903), Leng (1920), Leng and Mutchler (1927, 1933), and Blackwelder (1939) many American species of *Chrysobothris* are listed, but since these publications are only catalogues, the citations are omitted from the bibliography under the species.

The larvae of *Chrysobothris* attack both deciduous and coniferous trees, as well as shrubs and herbaceous plants. Some species attack only conifers, some only deciduous trees, while others attack both. Plants of all ages may be attacked, and any part of the plant from the roots to the twigs, but the parts most subject to attack are the bark and wood of the main trunk, the larvae causing worm holes and making lumber from infested trees unfit for high-grade uses.

DESCRIPTION OF THE GENUS

Head vertical, the front even or uneven, much wider at bottom than at vertex, and narrowed by the insertion of the antennae; clypeus broad, more or less sinuate or emarginate in front, and constricted posteriorly by the antennal cavities, which are small and rounded. Antenna variable in shape, sometimes bipectinate in the

males. Eyes very large, elongate, strongly oblique on inner margins, and closer to each other on the vertex than at the bottom. Pronotum usually wider than long, variable in shape, the base bisinuate, and usually lobed at the middle, with the lobe frequently truncate in front of scutellum. Scutellum small, triangular, rarely long and acuminate toward apex. Elytra about twice as long as wide, rounded or angulated at bases, strongly converging posteriorly, with the sides serrate or entire toward apices. Prosternum broad, flat or convex, the anterior margin frequently with a median lobe. Legs robust; femora swollen at middle, the anterior pair usually armed with a large tooth; tarsus compressed, the first segment of posterior one long, and the third segment slightly emarginate, but not armed with long spines at the apex; tarsal claws simple.

Head.—In nearly all our species there is a narrow, smooth, longitudinal carina on the occiput and vertex, this carina frequently becoming bifurcate anteriorly and forming a more or less distinct chevron on the vertex. The term "vertex" is used in the descriptions for the upper part of the front of the head, and "occiput" for the top of the head between the eyes. Frequently there are two small, smooth callosities on the front, but these are variable in the same species and cannot be used in separating allied forms. Sexually the head varies in color, sculpture, and density of the pubescence, the front being usually much flatter, more densely pubescent, and more finely punctured in the male than in the female, and the head in the male being frequently green, whereas in the female it is aeneous or cupreous. The eyes are usually widely separated on the top, but in a few cases they are nearly contiguous. The form of the clypeus is usually more or less uniform in the same species and offers a good character for separating many of the allied forms. It is usually triangularly or arcuately emarginate in front, in some species more widely and deeply than in others, and in some species is slightly variable in shape and depth, so care must be exercised in making use of this character in some species. In a small series of species the clypeus has a notch at the middle, on each side of which is a tooth, which is more or less variable in length in the same species. In *floricola* the clypeus is transversely truncate or sinuate in front, and in the *femorata* group (of authors) it is acutely incised at the middle, semicircularly rounded on each side.

Antenna.—The antenna is either uniform in color or green at base becoming cupreous toward the apex, and frequently the outer portions of the segments are of a slightly different color, but this character is only used in the key when these portions are conspicuously pale yellow, and not merely pale brown. Sexually the antenna varies in color, and is usually more greenish or bronzy green in the male than in the female. It is usually narrowed to the apex; sometimes the segments are of equal width, but in *ludificata* the apical segments are twice as wide as long, and distinctly wider than the intermediate segments. In a small number of species from the western part of the United States the male has the antenna bipectinate, whereas in the female it is simply serrate. The intermediate segments are either quadrate and compact, or triangular and more or less separated from one another at their outer angles.

Pronotum.—The disk may be regularly convex, even, more or less uniformly punctured, and without depressions or irregular, smooth elevations, or it may be convex (sometimes slightly flattened), uneven, with depressions and irregular, smooth, elevated callosities, in which case the surface is usually irregularly punctured. The lateral margins when seen from above are quite variable in the same species, and are

useless in separating allied species. In the descriptions the base is mentioned as being emarginate, but it is really transversely truncate and simply depressed on the upper surface, where it is covered by the base of the elytra, and when seen from above seems to be emarginate. When the length is being compared with the width, the measurement of the length is taken at the middle and that of the width at the widest part.

Scutellum.—The scutellum in the North American species is usually very small and triangular, but in a few it is long and strongly acuminate toward the apex.

Elytra.—The lateral margins are usually coarsely serrate posteriorly, but in a few species they are not or are only vaguely serrate near the apices. The humeral angles are broadly rounded in all the North American species. In a number of western species the surface is clothed with short hairs, which may become inconspicuous, especially on the basal regions, and in poorly preserved specimens there may be some difficulty in seeing these hairs. In some species there are a few hairs on the lateral edge of the elytron, but these species are not considered as having pubescent elytra. The surface is either with or without discal foveae and longitudinal costae; frequently only the first costa on each elytron is distinct, the other costae being more or less interrupted and joined to one another by irregular, transverse, smooth spaces, and in many western species, which live on conifers, the sculpture is of little value in separating species. The first costa, as cited in this paper, is the one next to the sutural margin.

Prosternum.—The surface is usually densely punctured and pubescent in the males, and more coarsely punctured and sparsely pubescent in the females, but sometimes the surface is similar in both sexes, and may be nearly smooth, especially on the median part. The anterior margin may be truncate, arcuately rounded, or with a more or less distinct median lobe. This character has been misused by some writers and has caused much confusion in identifying species. In this paper the prosternum is considered as being lobed when there is a lobe in front of the thickened anterior margin, and not when the anterior margin is arcuately rounded. This lobe varies greatly in form and size, sometimes being distinct and abruptly developed, and in other species it is very narrow and inconspicuous.

Abdomen.—The last visible sternite has the lateral margins either distinctly serrate or crenulate, or entire, but in *libonoti* and *costifrons* they are interrupted near the middle. Sometimes the sternite is longitudinally concave or longitudinally carinate at the middle, and frequently there is a dentate, elevated, submarginal ridge on each side. In all our species the apex of the last visible sternite in the male is emarginate, but varying in extent among the species, from a deep quadrangular notch to a shallow, arcuate emargination. In the female the emargination is usually smaller, sometimes truncate or sinuate, and rarely tridentate, and some care must be exercised in using this character in the females, as it seems to be variable in some species.

The eighth tergite (frequently called the pygidium) is different in the two sexes. Usually the surface is more deeply and coarsely punctured in the female than in the male, and in some species it is longitudinally carinate in the female.

Legs.—The femora are alike in the two sexes, except that sometimes they are more robust in the males, and nearly all the species have a large tooth, which is dentate or entire on the outer margin, but in a few the tooth is absent. In nearly all the species sexual differences are found on the anterior tibia, but in a few there is scarcely any difference between the two sexes. In the male the anterior tibia is usually more or less arcuate, and is armed on the inner margin with a single tooth, a number of small teeth, or an apical dilation. This character is very useful in separating the males from allied species, but some allowance must be made for a slight variation in the shape of the apical dilation in some species. In the female the anterior tibia is less arcuate and without teeth or dilations on the inner margin. The middle tibia is usually straight in the female, but in the male it is not so strongly arcuate as the anterior one, slightly thickened at the apex in a few species, and in *femorata* auct. and *merkelii* armed with a number of small teeth on the inner margin similar to those of the anterior tibia. In one species, *scabripennis*, the posterior tibia of the male is arcuate.

Genitalia.—The male genitalia are strongly chitinous, and composed of the lateral and median lobes. The basal piece and lateral lobes are consolidated, allowing the median lobe to be extended beyond the tips of the lateral lobes. The genitalia show considerable differences in shape and sculpture, but very little variation in the same species; however, there is a slight variation in the width of the dilation of the lateral lobes in some specimens of the same species. The genitalia are very useful for separating species, and especially in checking individual specimens that are more or less abnormal.

KEY TO THE SPECIES OF CHRYSOBOTHRIS

1. Elytra clothed with more or less conspicuous hairs, sometimes only barely indicated apically 2
   Elytra without hairs, except sometimes on lateral margins posteriorly 23
2. Anterior femur toothed 3
   Anterior femur not toothed 22
3. Body above bright green, blue, or violaceous blue 4
   Body above dark bronzy brown to coppery brown, rarely dull bronzy green, sometimes with a greenish reflection in different lights 5
4. Tooth on anterior femur coarsely dentate on outer margin; lateral margins of elytra serrate posteriorly ..... (1) *cyanella* Horn, p. 30.
   Tooth on anterior femur not dentate on outer margin; lateral margins of elytra not serrate posteriorly ..... (2) *boharti* Van Dyke, p. 32.
5. Pronotum convex, without a median depression 6
   Pronotum more or less flattened, or with a distinct median depression 14
6. Body narrowly elongate, subcylindrical 7
   Body broadly elongate 8
7. Anterior tibia of male with an indistinct dilation near apex; median lobe of male genitalia acute at apex; last visible abdominal sternite of female subtruncate or slightly rounded at apex ..... (3) *lixa* Horn, p. 34.
   Anterior tibia of male with a distinct dilation near apex; male genitalia twice as long as in *lixa*, and with the median lobe rounded at apex, last visible abdominal sternite of female transversely sinuate at apex ..... (4) *arizonica* Chamberlin, p. 36.
8. Each elytron with four more or less distinct, smooth, longitudinal costae, usually extending from near apex to base 9
   Each elytron without, or with one to three more or less distinct, longitudinal costae, which do not extend to base 13
9. Costae on elytra elevated posteriorly 10
   Costae on elytra not elevated posteriorly 12

10. Foveae on elytra distinct, interrupting the longitudinal costae (5) *deleta* LeConte, p. 38.
Foveae on elytra obsolete, not or only vaguely interrupting the longitudinal costae 11
11. Clypeus arcuately emarginate in front; last visible sternite of female broadly rounded at apex; male known (6) *chamberlini*, new name, p. 40.
Clypeus triangularly emarginate in front; last visible sternite of female strongly bisinuate at apex; male unknown (7) *bisinuata* Chamberlin, p. 42.
12. Anterior tibia of male with a distinct, rounded dilation near apex; male genitalia constricted at the sides ..... (8) *deserta* Horn, p. 43.
Anterior tibia of male without a distinct dilation near apex; male genitalia arcuately rounded at the sides (9) *atriplexae*, new species, p. 45.
13. Anterior femur with an acute tooth; last visible abdominal sternite of male broadly, shallowly emarginate at apex, of the female transversely sinuate at apex ..... (10) *grindeliae* Van Dyke, p. 47.
Anterior femur with an obtuse tooth; last visible abdominal sternite of male deeply, arcuately emarginate at apex, of the female broadly rounded or slightly notched at apex (11) *fragariae* Fisher, p. 49.
14. Dorsal surface of body with distinct hairs 15
Dorsal surface of body with indistinct hairs 17
15. Lateral margins of elytra distinctly serrate posteriorly (12) *pubescens* Fall, p. 51.
Lateral margins of elytra not distinctly serrate posteriorly 16
16. Each elytron with four more or less distinct, longitudinal costae; dilation on anterior tibia of male obtusely angulated at apex (13) *oregona* Chamberlin, p. 53.
Each elytron without, or with only one or two more or less distinct, longitudinal costae; dilation on anterior tibia of male broadly rounded at apex ..... (11) *fragariae* Fisher, p. 49.
17. Lateral margins of elytra distinctly serrate posteriorly 18
Lateral margins of elytra not distinctly serrate posteriorly 21
18. Each elytron with three to four strongly elevated, longitudinal costae extending from base to near apex, sometimes more or less interrupted 19
Each elytron usually with only the first costa strongly elevated posteriorly ..... (14) *mali* Horn, p. 55.
19. Head and pronotum brilliant reddish cupreous, the latter not distinctly sulcate at middle ..... (15) *lineatipennis* Van Dyke, p. 58.
Head and pronotum not brilliant reddish cupreous, the latter distinctly sulcate at middle 20
20. Dilation on anterior tibia of male nearly one-third as long as tibia (16) *beyeri* Schaeffer, p. 59.
Dilation on anterior tibia of male scarcely one-fourth as long as tibia (17) *bacchari* Van Dyke, p. 61.
21. Elytra with distinct greenish or cupreous foveae; lateral margins of last visible abdominal sternite distinctly serrate (18) *purpurata* Bland, p. 63.
Elytra without distinct greenish or cupreous foveae; lateral margins of last visible abdominal sternite not distinctly serrate (19) *aeneola* LeConte, p. 65.
22. Body above uniformly bright bronzy green ..... (20) *humilis* Horn, p. 67.
Body above bluish to violaceous black, and each elytron with a large reddish-cupreous humeral spot (21) *cupreohumeralis* Van Dyke, p. 68.
23. Lateral margins of last visible abdominal sternite serrate 24
Lateral margins of last visible abdominal sternite not serrate, rarely interrupted 110
24. Disk of pronotum even, without a distinct median depression (sometimes vaguely depressed) or elevated callosities 25
Disk of pronotum uneven, longitudinally sulcate at middle, and frequently with elevated callosities 58
25. Abdominal sternites (except sometimes the seventh) with distinct, more or less elevated, smooth, lateral callosities 26
Abdominal sternites without distinct, smooth, lateral callosities 40

26. Clypeus semicircularly emarginate in front 27
Clypeus not semicircularly emarginate in front 30
27. Prosternum distinctly, broadly lobed in front; small species, 6 to 9 mm 28
Prosternum arcuately rounded in front, but not distinctly lobed; large species, 10 to 12.5 mm 29
28. Male genitalia long and slender, sides nearly parallel (fig. 113, *F*) (22) *prosopidis*, new species, p. 70.
Male genitalia short and robust, sides arcuately rounded (fig. 116, *C*). (23) *debilis* LeConte, p. 72.
29. Clypeus with a distinct tooth on each side of emargination (24) *edwardsii* Horn, p. 74.
Clypeus broadly rounded on each side of emargination (25) *schaefferi* Obenberger, p. 76.
30. Pronotum uniformly convex 31
Pronotum more or less flattened ..... (14) *mali* Horn, p. 55.
31. Clypeus deeply emarginate in front; anterior tibia of male with a number of small teeth on inner margin near apex; last visible abdominal sternite of female broadly depressed, with a longitudinal, median carina 32
Clypeus not deeply emarginate in front; anterior tibia of male with a broad tooth or dilation near apex; last visible abdominal sternite of female not longitudinally carinate 33
32. Posterior femur coarsely dentate on outer margin (26) *basalis* LeConte, p. 78.
Posterior femur not dentate on outer margin (27) *octocola* LeConte, p. 80.
33. Clypeus acutely incised at middle, dentate on each side of incision 34
Clypeus broadly, arcuately or angularly emarginate in front, not dentate on each side of emargination 35
34. Species from West Coast (California, Oregon, Washington, Idaho, and Nevada) ..... (28) *semisculpta* LeConte, p. 83.
Species from Southwest (Arizona, New Mexico, Colorado, and Utah) (29) *cuprascens* LeConte, p. 86.
35. Last visible abdominal sternite longitudinally concave (30) *peninsularis* Schaeffer, p. 88.
Last visible abdominal sternite not longitudinally concave 36
36. Intermediate segments of antenna distinctly wider than long; elytra strongly angulated at bases 37
Intermediate segments of antenna not distinctly wider than long; elytra obtusely rounded at bases ..... (31) *texana* LeConte, p. 90.
37. Base of each elytron abruptly angulated at middle, transverse externally ..... (32) *helferi*, new species, p. 92.
Base of each elytron not abruptly angulated at middle, oblique externally 38
38. Anterior tibia of male with a slender, acute tooth one-third from apex, and the apex of eighth abdominal tergite broadly rounded or vaguely emarginate; last visible abdominal sternite of female narrowly, arcuately emarginate at apex (33) *ignicollis* Horn, p. 94.
Anterior tibia of male with a broad, triangular tooth near apex, and the apex of eighth abdominal tergite angularly produced; last visible abdominal sternite of female subtruncate or shallowly emarginate at apex 39
39. Elytra uniformly reddish cupreous or brownish cupreous (34) *speculifer* Horn, p. 96.
Elytra aeneous, with a greenish reflection on basal halves, reddish cupreous, frequently with a purplish reflection on apical halves (35) *iris* Van Dyke, p. 99.
40. Anterior femur with a distinct tooth 41
Anterior femur without a distinct tooth 56
41. Elytra with distinct discal foveae 42
Elytra without distinct discal foveae 48
42. Surface above green or bluish green ..... (36) *viridicyanea* Horn, p. 100.
Surface above brown, brownish black, or cupreous 43
43. Pronotum unicolored 44
Pronotum bicolored 46

44. Clypeus deeply, semicircularly or angularly emarginate in front. Western part of the United States.. (23) *debilis* LeConte, p. 72.
Clypeus broadly, arcuately, but not deeply emarginate in front. Eastern part of the United States 45
45. Male with the head, and antenna in part, bright green; last visible abdominal sternite of female rather deeply arcuately emarginate at apex ..... (37) *neopusilla*, new species, p. 102.
Male with the head bronzy brown and the antenna piceous; last visible abdominal sternite of female rounded or shallowly emarginate at apex. (38) *pusilla* Castelnau and Gory, p. 103.
46. Pronotum with the sides and anterior part more or less reddish cupreous, the surface densely, coarsely punctate 47
Pronotum with only the sides reddish cupreous, the surface sparsely, finely punctate ..... (39) *lateralis* Waterhouse, p. 106.
47. Elytra with smooth, longitudinal costae apically; punctures on median part of pronotum more or less contiguous (40) *carmelita* Fall, p. 108.
Elytra without smooth, longitudinal costae apically, sometimes with a vague sutural costa on each elytron, but the costa punctured like rest of surface; punctures on median part of pronotum subequal in width to the intervals ... (41) *piuta* Wickham, p. 110.
48. Elytra with large reddish-cupreous humeral spots 49
Elytra without reddish-cupreous humeral spots 50
49. Pronotum unicolored, black to bronzy brown. (42) *axillaris* Horn, p. 112.
Pronotum bicolored, bronzy brown, with a reddish-cupreous, anterior median spot ..... (43) *acaciae* Knull, p. 114.
50. Surface above green (sometimes more or less bronzy green) to violaceous blue 51
Surface above bronzy brown, with a more or less cupreous tinge 54
51. Elytra with more or less distinct purplish-black vittae or spots 52
Elytra uniformly light green to violaceous blue, without purplish-black vittae or spots 53
52. Clypeus semicircularly emarginate in front (44) *purpureoplagiata* Schaeffer, p. 115.
Clypeus broadly, but not semicircularly, emarginate in front (45) *purpureovittata* Horn, p. 117.
53. Anterior tibia of male with an acute tooth near apex, and the genitalia broadly rounded at the sides; last visible abdominal sternite of female slightly, broadly emarginate at apex. Western part of the United States ..... (36) *viridicyanea* Horn, p. 100.
Anterior tibia of male with a broadly rounded dilation near apex, and the genitalia constricted at the sides; last visible abdominal sternite of female narrowly notched at apex. Eastern part of the United States ..... (46) *harrisi* (Hentz), p. 119.
54. Base of each elytron strongly angulated; anterior femur with a long, acute tooth; middle tibia of male unarmed near apex 55
Base of each elytron not strongly angulated; anterior femur with a short, obtuse tooth; middle tibia of male with a large, rounded tooth near apex ..... (47) *chiricahuae* Knull, p. 122.
55. Pronotum moderately convex; anterior tibia of male with a small, rounded dilation at apex ..... (48) *micromorpha* Fall, p. 123.
Pronotum strongly flattened; anterior tibia of male with a triangular tooth at apical third ..... (49) *kelloggi* Knull, p. 125.
56. Elytra with discal foveae ..... (50) *parapiuta* Knull, p. 126.
Elytra without discal foveae 57
57. Body above uniformly bright bronzy green.. (20) *humilis* Horn, p. 67.
Body above bluish to violaceous black, and each elytron with a large reddish-cupreous humeral spot (21) *cupreohumeralis* Van Dyke, p. 68.
58. Clypeus transversely truncate, or at most only sinuate in front (51) *floricola* Gory, p. 128.
Clypeus emarginate, or with a median incision in front 59
59. Anterior tibia of male armed with a number of small teeth on inner margin; eighth abdominal tergite of female longitudinally carinate. 60
Anterior tibia of male armed with a single tooth or dilation on inner margin; eighth abdominal tergite of female not longitudinally carinate (except in *exesa*) 63

60. Clypeus acutely notched at middle and semicircularly rounded on each side; lateral lobes of male genitalia unequal in length, with the lateral spine on each side oblique 61
Clypeus acutely notched at middle but not semicircularly rounded on each side; lateral lobes of male genitalia equal in length, with the lateral spine on each side transverse
(52) *adelpha* Gemminger and Harold, p. 130.
61. Antenna gradually narrowed to apex, the last segment not distinctly transverse and narrower than the tenth segment; male genitalia with tip of median lobe wider than tip of lateral lobe; median carina on eighth abdominal tergite of female not extending beyond apical notch 2
Antenna not narrowed to apex, the last segment transverse or quadrate, and as wide as the tenth segment; male genitalia with tip of median lobe not wider than tip of lateral lobe; median carina on eighth abdominal tergite of female strongly elevated and extending beyond apical notch. (53) *rugosiceps* Melsheimer, p. 131.
62. Antennal segments of male distinctly pale yellow toward outer margins, and the sides of the genitalia arcuately rounded and not constricted near apices; eighth abdominal tergite of female shallowly depressed on each side of median carina
(54) *viridiceps* Melsheimer, p. 132.
Antenna of male bronzy green, usually becoming reddish cupreous toward apex, but the segments not distinctly pale yellow toward outer margins, and the sides of the genitalia constricted near apices; eighth abdominal tergite of female usually deeply depressed on each side of median lobe. (55) *femorata* (Olivier), p. 133.
63. Clypeus narrowly, triangularly emarginate in front, or acutely incised at the middle 64
Clypeus broadly, triangularly or arcuately emarginate in front 67
64. Clypeus acutely incised at middle, with a tooth on each side of the incision 65
Clypeus narrowly, triangularly emarginate in front, without a tooth on each side of the emargination. (56) *lilaceous* Chamberlin, p. 136.
(57) *juniperinus* Chamberlin, p. 137.
65. Tooth on anterior tibia of male one-fourth from apex; last visible abdominal sternite of female deeply, broadly, arcuately emarginate at apex ..... (58) *burkei* Chamberlin, p. 139.
Tooth on anterior tibia of male one-third from apex; last visible abdominal sternite of female shallowly, arcuately emarginate at apex 66
66. Species from West Coast (California, Oregon, Washington, Idaho, and Nevada) ..... (28) *semisculpta* LeConte, p. 83.
Species from Southwest (Arizona, New Mexico, Colorado, and Utah) ..... (29) *cuprascens* LeConte, p. 86.
67. Body above green (sometimes with a bronzy tinge) to violaceous blue or purple 68
Body above black, brown, cupreous, or bronzy brown 71
68. Elytra green, and each elytron ornamented with a purplish spot at apical third ..... (59) *subopaca* Schaeffer, p. 140.
Elytra uniformly green, bluish green, or purple, without purple spots at apical third 69
69. Antennal segments distinctly yellowish toward outer margins; pronotum very uneven; large species, 12.5 to 16 mm.
(60) *verdigripennis* Frost, p. 141.
Antennal segments not yellowish toward outer margins; pronotum at most with only a vague, median depression; small species, 6.5 to 11 mm 70
70. Anterior tibia of male with an acute tooth near apex, and the genitalia broadly rounded at the sides; last visible abdominal sternite of female slightly, broadly emarginate at apex. Western part of the United States ..... (36) *viridicyanea* Horn, p. 100.
Anterior tibia of male with a broadly rounded dilation near apex, and the genitalia constricted at the sides; last visible abdominal sternite of female narrowly notched at apex. Eastern part of the United States ..... (46) *harrisi* (Hentz), p. 119.

71. Antennal segments 4–11 in part distinctly yellowish ---- 72
Antennal segments 4–11 not distinctly yellowish, but sometimes more or less pale piceous ---- 74
72. Prosternum with a distinct median lobe ---- (61) *exesa* LeConte, p. 143.
Prosternum without a distinct median lobe ---- 73
73. Anterior tibia of male with a large emarginated dilation at apex; dorsal surface of body frequently greenish (60) *verdigripennis* Frost, p. 141.
Anterior tibia of male with a small, slightly emarginated dilation at apex; dorsal surface of body never greenish (62) *dentipes* (Germar), p. 146.
74. Pronotum longitudinally (sometimes vaguely) sulcate at middle ---- 75
Pronotum transversely rugose at middle, not longitudinally sulcate, but with an arcuate or two irregular depressions on each side of middle ---- (63) *dolata* Horn, p. 148.
75. Outer segments of antenna nearly twice as wide as long in both sexes ---- (64) *ludificata* Horn, p. 150.
Outer segments of antenna not much wider than long in both sexes ---- 76
76. Prosternum with a median lobe ---- 77
Prosternum without a median lobe ---- 90
77. Clypeus shallowly emarginate in front ---- 78
Clypeus deeply emarginate in front ---- 83
78. Pronotum deeply, longitudinally sulcate at middle (65) *quadrilineata* LeConte, p. 153.
Pronotum indistinctly, at most only slightly, longitudinally sulcate at middle ---- 79
79. Pronotum with distinct, irregular, smooth, elevated callosities; large species, 17 mm ---- (66) *grandis* Chamberlin, p. 155.
Pronotum without distinct, smooth, elevated callosities; small species, 6–14 mm ---- 80
80. Elytra subopaque, uniformly punctate, without distinct foveae or elevated smooth spaces ---- (67) *nixa* Horn, p. 156.
Elytra rather strongly shining, irregularly punctate, with distinct, elevated, smooth spaces, or indistinct discal foveae ---- 81
81. Abdominal sternites with smooth lateral callosities; prosternum usually smooth at middle ----— (31) *texana* LeConte, p. 90.
Abdominal sternites without smooth lateral callosities; prosternum densely punctured at middle ---- 82
82. Male with the head, and antenna in part, bright green; last visible abdominal sternite of female rather deeply, arcuately emarginate at apex ---- (37) *neopusilla*, new species, p. 102.
Male with the head bronzy brown and the antenna piceous; last visible abdominal sternite of female rounded or shallowly emarginate at apex ---- (38) *pusilla* Castelnau and Gory, p. 103.
83. Pronotum with distinct, irregular, elevated, smooth callosities ---- 84
Pronotum without distinct, irregular, elevated, smooth callosities ---- 87
84. Anterior femur with a long, acute tooth; eighth abdominal tergite of female longitudinally carinate ---- (61) *exesa* LeConte, p. 143.
Anterior femur with a short, obtuse tooth; eighth abdominal tergite of female not longitudinally carinate ---- 85
85. Dilation on anterior tibia of male narrowed before apex (fig. 66, *A*), and genitalia slender, with sides slightly expanded at middle (fig. 120, *F*); last visible abdominal sternite of female not arcuately emarginate at apex, if so, transversely truncate at middle of emargination ---- 86
Dilation on anterior tibia of male not narrowed before the apex (fig. 65, *A*), and the genitalia broad, with the sides strongly expanded at middle (fig. 120, *E*); last visible abdominal sternite of female broadly, arcuately emarginate at apex ---- (68) *monticola* Fall, p. 158.
86. Dilation on anterior tibia of male abruptly narrowed at apex (fig. 66, *A*); last visible abdominal sternite of female with the emargination at apex limited at bottom by a thin, slightly projecting and deflexed plate (fig. 66, *D*) ---- (69) *caurina* Horn, p. 161.
Dilation on anterior tibia of male not abruptly narrowed at apex (fig. 67, *A*); last visible abdominal sternite of female deeply, narrowly notched at apex (fig. 67, *D*) ---- (70) *blanchardi* Horn, p. 163.

87. Each elytron with three to four strongly elevated, longitudinal, smooth costae extending from base to near apex, sometimes more or less interrupted 88
Each elytron usually with only the first costa strongly elevated posteriorly, other costae, if present, punctate. (14) *malii* Horn, p. 55.
88. Head and pronotum brilliant reddish cupreous, the latter not distinctly sulcate at middle ..... (15) *lineatipennis* Van Dyke, p. 58.
Head and pronotum not brilliant reddish cupreous, the latter distinctly sulcate at middle 89
89. Dilation on anterior tibia of male nearly one-third as long as tibia ..... (16) *beyeri* Schaeffer, p. 59.
Dilation on anterior tibia of male scarcely one-fourth as long as tibia ..... (17) *bacchari* Van Dyke, p. 61.
90. Large species, 14–17 mm 91
Small species, 6–13 mm 96
91. Clypeus deeply, angularly emarginate in front 92
Clypeus deeply, arcuately emarginate in front 93
92. Anterior tibia of male distinctly constricted behind dilation; last visible abdominal sternite of female deeply, narrowly, arcuately emarginate at apex ..... (71) *canadensis* Chamberlin, p. 165.
Anterior tibia of male not constricted behind dilation; last visible abdominal sternite of female very broadly, arcuately emarginate at apex ..... (72) *californica* LeConte, p. 167.
93. Last visible abdominal sternite of female broadly rounded at apex; male unknown ..... (73) *vulcanica* LeConte, p. 169.
Last visible abdominal sternite of female broadly, arcuately emarginate at apex; male known 94
94. Apical segment of antenna distinctly transverse; semitransparent part of lateral lobes of male genitalia triangular (fig. 121, *D*) (74) *woodgatei* Champlain and Knull, p. 171.
Apical segment of antenna not transverse; semitransparent part of lateral lobe of male genitalia of *orono* not triangular (fig. 121, *E*); male of *hubbardi* unknown 95
95. First costa on each elytron elevated and not interrupted posteriorly; last visible abdominal sternite of female deeply, arcuately emarginate at apex (fig. 71, *D*) ..... (75) *orono* Frost, p. 172.
First costa on each elytron interrupted posteriorly and not elevated; last visible abdominal sternite of female shallowly, arcuately emarginate at apex (fig. 72, *B*). (76) *hubbardi*, new species, p. 174.
96. Base of each elytron distinctly angulate at middle; pronotum usually without elevated, smooth spaces; anterior tibia of male with a triangular tooth near apex 97
Base of each elytron broadly rounded at middle; pronotum with more or less elevated, smooth spaces; anterior tibia of male with a dilation at apex, except in *chiricahuae*, which has a rounded tooth near apex 102
97. Pronotum strongly flattened above. (49)*kelloggi* Knull, p. 125.
Pronotum moderately convex above 98
98. Abdominal sternites (except sometimes the last) with more or less elevated, smooth, lateral callosities 99
Abdominal sternites without distinct, smooth, lateral callosities (47) *chiricahuae* Knull, p. 122.
99. Base of each elytron abruptly angulated at middle, transverse externally ..... (32) *helferi*, new species, p. 92.
Base of each elytron not abruptly angulated at middle, oblique externally 100
100. Anterior tibia of male with a slender, acute tooth one-third from apex and the apex of eighth abdominal tergite broadly rounded or vaguely emarginate; last visible abdominal sternite of female narrowly, arcuately emarginate at apex. (33) *ignicollis* Horn, p. 94.
Anterior tibia of male with a broad, triangular tooth near apex, and the apex of eighth abdominal tergite angularly produced; last visible abdominal sternite of female subtruncate or shallowly emarginate at apex 101

101. Elytra uniformly reddish cupreous or brownish cupreous
(34) *speculifer* Horn, p. 96.
Elytra aeneous, with a greenish reflection on basal halves, reddish cupreous, frequently with a purplish reflection on apical halves
(35) *iris* Van Dyke, p.99.
102. Body beneath (except legs) brownish or cupreous, sometimes with a faint greenish reflection ---- 103
Body beneath bright green to bronzy green, except in females of *sylvania* and *laricis*, which have the underside of the body more or less purplish cupreous, with a distinct bronzy-green tinge ---- 107
103. Posterior tibia of male arcuate; last visible abdominal sternite of female broadly, arcuately emarginate at apex (fig. 73, *D*)
(77) *scabripennis* Castelnau and Gory, p. 175.
Posterior tibia of male straight; last visible abdominal sternite of female with a small semicircular or triangular emargination at apex, if broadly emarginate the emargination limited at bottom by a deflexed plate ---- 104
104. Dilation on anterior tibia of male abruptly narrowed at apex (fig. 66, *A*); last visible abdominal sternite of female with the emargination at apex limited at bottom by a thin plate, the anterior margin of plate truncate or sinuate (fig. 66, *D*) - (69) *caurina* Horn, p. 161.
Dilation on anterior tibia of male not, or only slightly, narrowed at apex (fig. 74, *A*); last visible abdominal sternite of female with the emargination at apex not limited at bottom by a thin plate, except in *falli*, which has the anterior margin of the plate smooth, and arcuately emarginate or truncate ---- 105
105. Median lobe of male genitalia truncate at apex, last visible abdominal sternite of female with a deflexed plate or very small, triangular notch at apex ---- 106
Median lobe of male genitalia acute or narrowly rounded at apex (fig. 122, *A*); last visible abdominal sternite of female with a small, semicircular emargination at apex (fig. 74, *D*)
(78) *trinervia* (Kirby), p. 178.
106. Sides of median lobe of male genitalia slightly converging to apex, which is broadly truncate (fig. 122, *B*); last visible abdominal sternite of female with the emargination at apex limited at bottom by a thin plate, which is truncate or arcuately emarginate at apex (fig. 75, *D*) --- (79) *falli* Van Dyke, p. 180.
Sides of median lobe of male genitalia strongly converging to apex, which is narrowly truncate (fig. 122, *C*); last visible abdominal sternite of female with a very small, triangular notch at apex (fig. 76, *D*) ---- (80) *breviloba* Fall, p. 182.
107. Prosternum of male densely pubescent; female with the abdomen beneath purplish cupreous, with a bronzy-green tinge, and the last visible sternite deeply emarginate at apex ---- 108
Prosternum of male sparsely pubescent; female with the abdomen beneath green at middle, becoming purplish cupreous at the sides, and the last visible sternite broadly, shallowly emarginate at apex ---- 109
108. Dilation on anterior tibia of male abruptly narrowed at apex, tibia strongly constricted behind the dilation (fig. 77, *A*)
(81) *laricis* Van Dyke, p. 184.
Dilation on anterior tibia of male not abruptly narrowed at apex, tibia slightly constricted behind the dilation (fig. 78, *A*)
(82) *sylvania* Fall, p. 187.
109. Dilation on anterior tibia of male twice as long as wide (fig. 79, *A*); male genitalia broad, with the sides of median lobe slightly converging to apex, which is broadly rounded (fig. 122, *F*)
(83) *carinipennis* LeConte, p. 189.
Dilation on anterior tibia of male not twice as long as wide (fig. 80, *A*); male genitalia slender, with the sides of median lobe strongly converging to apex, which is acutely rounded (fig. 123, *A*)
(84) *pseudotsugae* Van Dyke, p. 191.
110. Elytra with either longitudinal costae or discal foveae ---- 111
Elytra without distinct longitudinal costae or discal fovae ---- 135
111. Lateral margins of last visible abdominal sternite more or less interrupted, but not serrate ---- 112
Lateral margins of last visible abdominal sternite entire ---- 113

112. Pronotum distinctly sulcate at middle; lateral margins of last visible abdominal sternite slightly interrupted (85) *libonoti* Horn, p. 193.
Pronotum not sulcate at middle; lateral margins of last visible abdominal sternite abruptly interrupted (86) *costifrons* Waterhouse, p. 195.
113. Last visible abdominal sternite with an elevated, serrate, submarginal ridge, sometimes only slightly elevated 114
Last visible abdominal sternite without an elevated, serrate, submarginal ridge 126
114. Large species, 12–22 mm 115
Small species, 6–10.5 mm 123
115. Scutellum long, acuminate posteriorly 116
Scutellum short, triangular, and not acuminate posteriorly 121
116. Pronotum with a median depression 117
Pronotum without a distinct median depression 118
117. Eyes nearly contiguous on occiput; sides of pronotum parallel and strongly sinuate at middle (87) *tranquebarica* (Gmelin), p. 198.
Eyes distinctly separated on occiput; sides of pronotum obtusely rounded near apical angles and obliquely converging posteriorly (88) *acuminata* LeConte, p. 201.
118. Elytra acutely produced at apices (89) *acutipennis* Chevrolat, p. 203.
Elytra not acutely produced at apices 119
119. Each elytron with three to six golden-green or reddish-cupreous discal foveae 120
Each elytron with two indistinct discal foveae (90) *merkelii* Horn, p. 205.
120. Body above purplish blue; second costa on each elytron interrupted by the anterior fovea ..... (91) *gemmata* LeConte, p. 207.
Body above brownish cupreous; second costa on each elytron continuing through the anterior fovea (92) *wickhami*, new species, p. 209.
121. Elytra with distinct, broad, irregular, elevated, smooth spaces, the sculpture resembling that of the species of *Chalcophora* (93) *chalcophoroides* Horn, p. 210.
Elytra without distinct, broad, elevated, smooth spaces, the sculpture resembling that of *costifrons* 122
122. Last visible abdominal sternite of female narrowly, deeply, arcuately emarginate at apex; median lobe of male genitalia dentate on lateral margins ..... (94) *bispinosa* Schaeffer, p. 211.
Last visible abdominal sternite of female broadly, shallowly, arcuately emarginate at apex; median lobe of male genitalia not dentate on lateral margins ..... (95) *serripes* Schaeffer, p. 213.
123. Elytra with distinct green or coppery-yellow discal foveae 124
Elytra without discal foveae ..... (96) *analis* LeConte, p. 215.
124. Elytra with more or less distinct longitudinal costae; basal depression on each elytron without or with an indistinct colored spot 125
Elytra without longitudinal costae; basal depression on each elytron with a distinct green or coppery-yellow spot (97) *chrysoela* (Illiger), p. 217.
125. Underside of body piceous, with distinct purplish, greenish, or bronzy reflections; sides of pronotum parallel posteriorly; each elytron with one more or less distinct longitudinal costa; male genitalia with the sides of lateral lobes arcuate near apices (fig. 125, *A*) (98) *bimarginicollis* Schaeffer, p. 219.
Underside of body bright green at middle, purplish brown at sides; sides of pronotum converging posteriorly; each elytron with more than one longitudinal costa; male genitalia with the sides of lateral lobes parallel near apices (fig. 125, *B*) (99) *fiskei*, new species, p. 221.
126. Elytra with distinct foveae 127
Elytra without distinct foveae 134
127. Elytra with more or less distinct longitudinal costae 128
Elytra without a trace of longitudinal costae 131
128. Body above dark bronzy brown 129
Body above violaceous, cupreous, or bluish (100) *azurea* LeConte, p. 221.
129. Last visible abdominal sternite slightly, longitudinally carinate (101) *sexsignata* (Say), p. 224.
Last visible abdominal sternite not longitudinally carinate 130

130. Body beneath piceous, with distinct purplish, greenish, or bronzy reflections; each elytron with a single longitudinal costa; male genitalia with the sides of lateral lobes arcuate near apices (fig. 125, *A*)---------- (98) *bimarginicollis* Schaeffer, p. 219.
Body beneath bright green at middle, purplish brown at sides; each elytron with more than one longitudinal costa; male genitalia with the sides of lateral lobes parallel near apices (fig. 125, *B*)
(99) *fiskei*, new species, p. 221.
131. Pronotum twice as wide as long; elytra finely punctate, purplish red, with distinct green or coppery-yellow foveae, the median one distinctly impressed---------- 132
Pronotum not twice as wide as long; elytra coarsely punctate, violaceous black (rarely with a cupreous tinge) or bluish green, with bluish-green foveae or purplish-brown spots, the median one at most only slightly impressed---------- 133
132. Eyes nearly contiguous on occiput; pronotum arcuately rounded at the sides; each elytron with two short, transverse, green fasciae, and a green spot at apex; small species, 4.5–5 mm.
(104) *sexfasciata* Schaeffer, p. 230.
Eyes rather widely separated on occiput; pronotum not arcuately rounded at the sides; each elytron with five round, green or coppery-yellow discal spots, the spots rarely connected transversely, and without a green spot at apex; larger species, 6–9 mm---------- (97) *chrysoela* (Illiger), p. 217.
133. Dorsal surface of body violaceous brown; elytra with greenish or violaceous-blue spots, the median one on each elytron slightly impressed---------- (102) *concinnula* LeConte, p. 226.
Dorsal surface of body bluish green; elytra with purplish-brown spots, the median one on each elytron not impressed
(103) *scitula* Gory, p. 229.
134. Each elytron with a single, more or less distinct, granulose, longitudinal costa; clypeus broadly, angularly emarginate in front, and broadly rounded on each side- (19) *aeneola* LeConte, p. 65.
Each elytron with four distinct, smooth, longitudinal costae; clypeus acutely, angularly emarginate in front, and transversely truncate on each side---------- (105) *convexa* Fall, p. 231.
135. Elytra with violaceous spots or transverse fasciae---------- 136
Elytra without distinct violaceous spots or transverse fasciae---------- 140
136. Body above bronzy green to bluish green---------- 137
Body above brownish cuprous---------- (106) *biramosa* (Fisher), p. 233.
137. Pronotum widest at basal third, the sides obliquely converging anteriorly---------- (107) *ulkei* LeConte, p. 234.
Pronotum widest at middle, the sides arcuately rounded, or nearly parallel and sinuate---------- 138
138. Clypeus deeply, triangularly emarginate in front, with an acute median notch; male antenna not bipectinate---------- 139
Clypeus shallowly, arcuately emarginate in front, without a median notch; male antenna bipectinate- (108) *atrifasciata* LeConte, p. 235.
139. Large species, 12–14 mm.; sides of pronotum arcuately rounded (109) *socialis* Waterhouse, p. 237.
Small species, 7–9.5 mm.; sides of pronotum usually parallel and more or less sinuate at middle---------- (110) *lucana* Horn, p. 239.
140. Large species, 10–13 mm---------- 141
Small species, 5.5–9.5 mm---------- 142
141. Clypeus transversely truncate in front; dorsal surface of body subopaque; anterior femur with a short, obtuse tooth, which is coarsely dentate on outer margin; male antenna not bipectinate (111) *platti* Cazier, p. 241.
Clypeus broadly emarginate in front; dorsal surface of body shining; anterior femur with an acute tooth, which is not dentate on outer margin; male antenna bipectinate--- (112) *alleni* Cazier, p. 243.
142. Body above uniformly bright bronzy green; apical angles of pronotum not obliquely truncate---------- 143
Body above bicolored (head and pronotum purplish brown to bronzy green, elytra violaceous blue to greenish blue); apical angles of pronotum obliquely truncate---------- (113) *bicolor* Horn, p. 244.
143. Last visible abdominal sternite with a submarginal ridge
(114) *smaragdula* Fall, p. 246.

Last visible abdominal sternite without a submarginal ridge..... 144

144. Lateral margins of elytra strongly serrate posteriorly
(115) *prasina* Horn, p. 247.

Lateral margins of elytra not serrate posteriorly
(2) *boharti* Van Dyke, p. 32.

NOTES AND RECORDS BY SPECIES

(1) Chrysobothris cyanella Horn

(Fig. 1; fig. 111, *A*)

Chrysobothris cyanella Horn, 1886, Amer. Ent. Soc. Trans. 13: 99, 102, pl. 5, figs. 164–168; Kerremans, 1892, Soc. Ent. de Belg. Mem. 1: 210; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 118; Woodworth, 1913, Guide to California Insects, p. 196; Van Dyke, 1916, Ent. News 27: 411–412; Chamberlin, 1917, Ent. News 28: 1939; 1925, N. Y. Ent. Soc. Jour. (1924) 32: 193 (separate, p. 192); 1926, Cat. Buprestidae North Amer., p. 145; 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 618; Chamberlin, 1934, Pan-Pacific Ent. 10: 36; Beer, 1940, Pan-Pacific Ent. 16: 15–16.

Figure 1.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris cyanella*.

Male.—Narrowly elongate, subcylindrical, slightly depressed above, moderately shining, uniformly bluish green; beneath violaceous blue, more strongly shining than above, the legs more or less bronzy green.

Head bronzy green, with two small, smooth callosities on the front and a vague longitudinal carina on occiput; front slightly, transversely depressed behind clypeus; surface confluently, coarsely, deeply, uniformly punctate, sparsely clothed with long, semierect, white hairs, the intervals densely granulose; clypeus rather deeply, angularly emarginate in front, arcuately rounded on each side. Antenna bronzy green, robust, short, extending to middle of pronotum, slightly narrowed to apex; intermediate segments wider than long, broadly rounded at outer margins; third segment subequal in length to the fourth.

Pronotum twice as wide as long, subequal in width at base and apex, widest at middle; sides parallel at middle, arcuately converging toward apical angles, obliquely converging posteriorly and vaguely constricted near posterior angles; anterior margin rather strongly sinuate, with a broad, strongly rounded, median lobe; base slightly, arcuately emarginate on each side, the median lobe slightly produced and broadly rounded; disk convex, with a vague median depression, and

a shallow depression an each side near apical angle; surface coarsely, densely, uniformly punctate, sparsely clothed with short, erect, inconspicuous hairs, the intervals densely, finely granulose.

Elytra slightly wider than pronotum, twice as long as wide; sides slightly sinuate behind humeral angles, arcuately expanded behind middle, then arcuately converging to the tips, which are separately broadly rounded; lateral margins slightly serrate; basal depressions broad and deep; humeral depressions elongate and shallow; disk moderately convex, with vague, longitudinal costae, surface coarsely, deeply, rather sparsely punctate basally, more finely punctate toward apices, sparsely clothed with short, erect, whitish hairs, the intervals obsoletely granulose.

Abdomen beneath sparsely, coarsely, irregularly punctate, sparsely clothed with rather short, recumbent, inconspicuous hairs, without lateral callosities, the intervals finely, densely granulose; last visible sternite rather deeply, arcuately emarginate at apex, without a submarginal ridge, the lateral margins slightly serrate; eighth tergite broadly, triangularly emarginate at apex, finely granulose, coarsely, densely punctate, but not longitudinally carinate. Prosternum coarsely, densely punctate, sparsely clothed with long, semierect, white hairs; anterior margin strongly deflexed, with a distinct, wide, short, median lobe. Anterior femur with a short, obtusely triangular tooth, which is dentate on outer margin. Anterior and middle tibiae arcuate, the former with a short, rounded dilation at apex; posterior tibia straight.

Length 9.25 mm., width 3.5 mm.

Redescribed from the male lectotype, No. 3442, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the antenna uniformly piceous, the last visible sternite more elongate and slightly emarginate at apex, the eighth tergite shallowly emarginate at apex, the middle tibia straight, and the anterior tibia unarmed at apex.

Type locality.—California. The lectotype is simply labeled "Calif.," but Horn states that it occurs in the mountain regions of northern California near Yreka and Mt. Shasta.

DISTRIBUTION

From material examined:

California: Yreka, Paradise Valley, Kings River, July 16, 1917 (R. L. Beardsley). Yosemite, altitude 3,880–4,000 feet, June 18, 1928 (E. F. Wohletz). Alder Creek, Yosemite National Park, July 26, 1915 (H. G. Champion). Los Angeles County, July (D. W. Coquillett). Mather, July 19, 1938 (E. G. Linsley). Towle, June 25, 1933; Dead Man's Creek, Mono County, July 25, 1936; Dardanelle, Tuolumne County, June 27, 1937 (M. Cazier).

Oregon: Ashland, June 25, 1915, June 24, 1916 (F. P. Keen).

Chamberlin (1917, 1926) reports it as being rare but widely distributed throughout the Cascade Sierra region, and records it from the following localities in California: Lake Tahoe, Pasadena, Bishop, and Shasta and El Dorado Counties.

Hosts.—The adults have been collected by different collectors in Oregon and California on the flowers of wild buckwheat (*Eriogonum* sp.). Chamberlin (1925) records it as breeding in yellow pine (*Pinus ponderosa* Lawson) twigs, but this host record should be verified. Beer (1940) records collecting the larvae in the woody roots of wild buckwheat (*Eriogonum nudum*) and states that many of the larvae had been destroyed by parasites.

This species shows considerable variation in color and size. As in many of the blue and green species of this genus, the color varies from golden green through blue to violet, with all intermediate shades. The pronotum is usually widest at the middle where the

sides are more or less parallel, but in a few specimens examined the pronotum was widest near the apical fourth and the sides more strongly converging posteriorly. In the large specimens the pronotum is vaguely depressed at the middle and the longitudinal costae on the elytra are vaguely indicated, but in the smaller specimens these depressions and costae are entirely obliterated. The lateral margins of the elytra are distinctly serrate posteriorly in some specimens, whereas in others the margins are so indistinctly serrate as to be considered as entire. In most females examined the tips of the last visible sternite and eighth tergite are slightly emarginate, but occasionally specimens are found in which they could not be considered as being emarginate. The specimens examined from Oregon are slightly broader, and the hairs are slightly longer and denser than in the specimens from California. Van Dyke (1916) records collecting a good series of adults under the same conditions and in the same locality in the King River region of the southern Sierras, which varied in color from brilliant bluish green through bronzy green to cupreous. In the middle Sierras and northward they are more apt to be bluish green and the color more constant. The length is from 5 to 9.5 mm.

(2) CHRYSOBOTHRIS BOHARTI Van Dyke

(Fig. 2; fig. 111, *B*)

Chrysobothris boharti Van Dyke, 1934, Ent. News 45: 89–90.

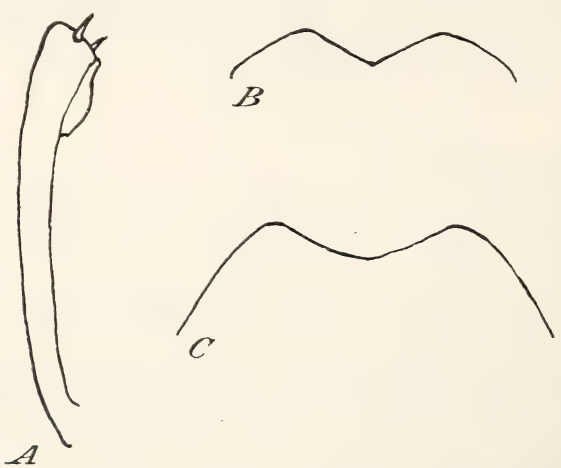

FIGURE 2.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) of *Chrysobothris boharti*.

Male.—Moderately elongate, more or less depressed above, rather strongly shining, uniformly bronzy green; beneath bottle green, with a slight bronzy tinge, and more strongly shining than above.

Head uniformly bronzy green, with a vague chevron on the front and a vague, longitudinal carina on occiput; front slightly convex; surface densely, coarsely ocellate-punctate, sparsely clothed with rather short, recumbent hairs, the intervals finely granulose; clypeus broadly, angularly emarginate in front, broadly rounded on each side. Antenna piceous, more or less greenish toward base, gradually narrowed to apex; intermediate segments compact, wider than long, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest along middle; sides parallel at middle, arcuately converging anteriorly and posteriorly; anterior margin slightly sinuate, with an indistinct, broadly rounded, median lobe; base slightly, arcuately emarginate on each side, the median lobe slightly produced, and subtruncate in front of scutellum; disk moderately convex at middle, slightly flattened toward lateral margins, without distinct depressions or callosities, but with a smooth, narrow, median line extending from base to middle; surface glabrous, coarsely, shallowly, rather densely punctate, more or less rugose toward sides, the intervals finely granulose.

Elytra slightly wider than pronotum, twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins not distinctly serrate; humeral angles broadly rounded; basal depressions broad and rather deep; humeral depressions broad and very shallow; disk moderately convex; surface sparsely clothed with short, erect hairs, coarsely, rather densely punctate basally, more finely punctate apically, the intervals densely granulose. Each elytron with a vague median depression, and three or four vaguely indicated, longitudinal costae.

Abdomen beneath sparsely, finely punctate, sparsely clothed with short, recumbent hairs, without smooth, lateral callosities, the intervals finely granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, without a submarginal ridge, the lateral margins not serrate; eighth tergite shallowly, broadly emarginate at apex, densely, coarsely punctate, but not longitudinally carinate. Prosternum coarsely, densely punctate, rather densely clothed with long, semierect hairs, with a distinct, broad, short lobe in front. Anterior femur with a broad, obtusely triangular tooth, which is not dentate on outer margin. Anterior tibia arcuate, with a rather long dilation at apex; middle and posterior tibiae straight, the middle one expanded at apex.

Length 9.5 mm., width 4 mm.

Redescribed from a male paratype in the California Academy of Sciences.

Female.—No females have been examined by the writer, but Van Dyke in his original description says that the female differs from the male in having the prosternum less closely punctured at the middle, and more finely, sparsely pubescent, the last visible sternite either finely notched or but faintly emarginate at the apex, and the anterior tibia slightly arcuate and without a dilation at the apex.

Type locality.—Mt. Hoffman, 1,100 feet altitude, Yosemite National Park, Calif.; type in the California Academy of Sciences.

Distribution.—Described by Van Dyke from seven specimens collected at the type locality, July 30, 1933, by R. M. Bohart. The only specimen seen by the writer was the male paratype loaned for study by the California Academy of Sciences, through the kindness of Dr. Van Dyke.

Host.—Unknown.

This species is closely allied to *cyanella* and has been separated from that species because the lateral margins of the elytra are not serrate, but this seems to be a more or less variable character in *cyanella*. The only specimen of *boharti* examined differs from *cyanella* in having the tooth on the anterior femur not serrate on the outer margin, the sides of the male genitalia more arcuately expanded, and in being slightly larger than most of the specimens of *cyanella* examined. Van Dyke gives the length of *boharti* as from 8 to 10 mm., but one of the specimens of *cyanella* in the Horn collection is 9.5 mm. long, and Horn (1886) states that the largest specimen he examined was in the Edwards collection, from which he made his figure, and which measured 11.5 mm. in length.

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(3) Chrysobothris lixa Horn

(Fig. 3; fig. 111, *C*)

Chrysobothris lixa Horn, 1886, Amer. Ent. Soc. Trans. 13: 99, 101, pl. 5, figs. 159–163; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 216; Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 328; Griffith, 1900, Ent. News 11: 568; Fall, 1907, Canad. Ent. 39: 239; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 160–161 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 639 (part); Van Dyke, 1937, Brooklyn Ent. Soc. Bul. 32: 112.

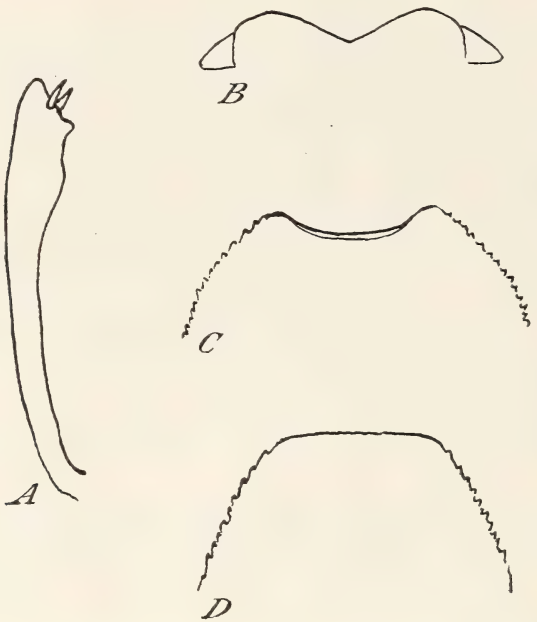

Figure 3.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris lixa*.

Female.—Rather narrowly elongate, subcylindrical, moderately shining, brownish black, with a distinct purplish tinge; beneath piceous, with distinct purplish and greenish tinges, and more strongly shining than above.

Head uniformly purplish brown, with a vague, longitudinal carina on occiput; front slightly convex; surface finely, rather densely, uniformly punctate, moderately clothed with long, semierect, whitish hairs, the intervals nearly smooth; clypeus broadly, rather deeply, angularly emarginate in front, broadly rounded on each side. Antenna purplish brown, gradually narrowed to apex; intermediate segments subtriangular, distinctly wider than long, broadly rounded at outer margins; third and fourth segments subequal in length.

Pronotum twice as long as wide, subequal in width at base and apex, widest at middle; sides regularly rounded; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base broadly, arcuately emarginate on each side, the median lobe feebly produced and broadly rounded; disk strongly convex, without callosities or depressions; surface coarsely, deeply, rather densely punctate, sparsely clothed with long, erect, inconspicuous hairs, the intervals indistinctly granulose.

Elytra scarcely wider than pronotum, twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions deep; humeral depressions broad and shallow; disk moderately convex; surface coarsely, densely punctate, rather densely clothed with short, erect, white hairs, the intervals indistinctly granu-

lose. Each elytron with two more or less distinct longitudinal costae on apical half, and with two vague foveae, one just in front of middle, the other at apical third.

Abdomen beneath sparsely, finely punctate, rather densely clothed with moderately long, recumbent, white hairs, the hairs denser toward sides, with smooth, lateral callosities, the intervals indistinctly granulose; last visible sternite broadly subtruncate at apex, the lateral margins distinctly serrate; eighth tergite rounded at apex, coarsely punctate, but not longitudinally carinate. Prosternum coarsely, sparsely punctate, sparsely clothed with long, semierect, white hairs; anterior margin with a broad, very short, median lobe. Anterior femur with a long, acute tooth, which is strongly dentate on outer margin. Anterior tibia slightly arcuate, unarmed at apex; middle and posterior tibiae straight.

Length 7.5 mm., width 2.75 mm.

Redescribed from the female lectotype, No. 3441, in the Academy of Natural Sciences of Philadelphia.

Male.—Differing from the female in having the head bronzy green in front, becoming reddish cupreous on the occiput, the antenna purplish brown, the last visible sternite broadly, arcuately emarginate at apex, the eighth tergite subtruncate or vaguely emarginate at apex, the prosternum coarsely, densely punctured posteriorly, but more finely punctured along anterior margin, and the anterior and middle tibiae more strongly arcuate, the former gradually expanded and armed with a vague dilation near apex.

Type locality.—Texas, no definite locality. Lectotype designated by Chamberlin (1926).

DISTRIBUTION

From material examined:

ARIZONA: No definite locality. Type series (H. K. Morrison). Palmerlee, May 25 (Biedermann). Catalina Springs, April-May (Hubbard and Schwarz).
TEXAS: No definite locality. Type series. Cotulla, March 27, 1904 (Jones and Pratt).

The species has also been recorded in the literature from Phoenix, Huachuca Mountains, and Nogales, Ariz. Chamberlin (1926) reports it from Nevada, based on a specimen in the Academy of Natural Sciences of Philadelphia, but that specimen is erroneously identified as *lixa*, and also from Williams, Ariz., but the latter specimen is *arizonica* Chamberlin. Horn (1894) records it from Calamajuet, Lower California, but no specimens from that region have been examined by the writer.

Hosts.—The larval habits are not known, but Hubbard and Schwarz collected the adults in Arizona on *Jatropha multifida* Linnaeus. Van Dyke (1937) records the species as living on coniferous trees.

The series of specimens collected by Morrison in southern Arizona show considerable variation in the shape of the body. In some examples the sides of the pronotum are more strongly converging posteriorly than in others, and the sides of the elytra are parallel. In most of the specimens examined the pronotum is uniformly punctured, but occasionally a specimen is found with a smooth median space in front of the scutellum. The median lobe on the prosternum is so small on some examples that this species can hardly be classified with the species having the prosternum lobed. In a specimen from Catalina Springs, Ariz., the clypeus is slightly more deeply emarginate and the dilation on the anterior tibia a little more prominent, but the genitalia are like those of the specimens collected by Morrison. The length is from 4 to 8 mm.

The specimens labeled simply "Arizona" in the LeConte, Horn, and United States National Museum collections probably all belong to the original series of specimens of this species collected by H. K. Morrison in the southern part of Arizona. In the Horn collection are three specimens labeled "Texas," and unfortunately one of these females has been designated as the lectotype by Chamberlin.

(4) Chrysobothris arizonica Chamberlin

(Fig. 4; fig. 111, *D*)

Chrysobothris arizonica Chamberlin, 1938, Pan-Pacific Ent. 14: 13–14, figs. 14–16.

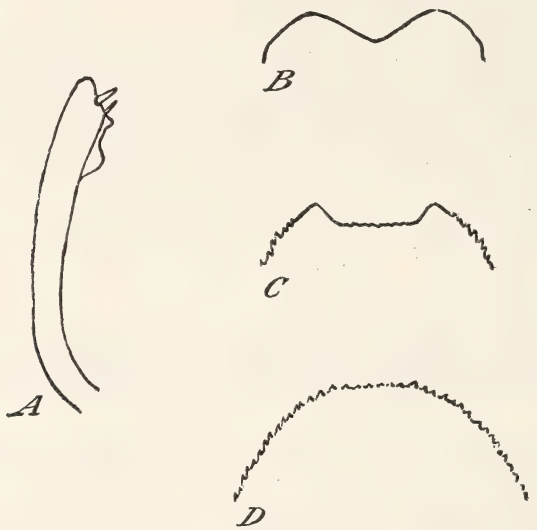

Figure 4.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris arizonica.*

Male.—Narrowly elongate, subcylindrical, moderately shining, bronzy brown, with a distinct cupreous tinge; beneath uniformly reddish cupreous, with a slight purplish tinge.

Head bronzy green in front, becoming cupreous on occiput, with a vague, smooth, longitudinal carina on occiput; front slightly convex; surface coarsely, rather densely, shallowly punctate, sparsely clothed with short, erect, inconspicuous hairs, the intervals finely, densely granulose; clypeus broadly, deeply, arcuately emarginate in front, broadly rounded on each side. Antenna uniformly piceous, with a faint bronzy-green tinge, gradually narrowed to apex; intermediate segments compact, wider than long, subtruncate at outer margins; third segment subequal in length to the fourth.

Pronotum three-fourths wider than long, slightly wider at apex than at base, widest along apical half; sides nearly parallel from apical angles to behind middle, then arcuately converging to posterior angles; anterior margin slightly sinuate, with a broadly rounded, median lobe; base arcuately emarginate on each side, the median lobe broadly rounded, and subtruncate in front of scutellum; disk strongly convex, without distinct callosities or depressions; surface coarsely, rather densely, shallowly, uniformly punctate, slightly rugose toward sides, sparsely clothed with long, erect, inconspicuous hairs, the intervals densely, finely granulose.

Elytra at base subequal in width to apical half of pronotum, twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to the tips, which are conjointly broadly rounded; lateral margins serrate; basal depressions broad and deep; humeral depressions shallow; disk rather strongly convex; surface finely, rather densely punctate, more or less rugose, sparsely clothed with short, erect, white hairs, the intervals feebly, densely granulose. Each elytron with two or three vague costae behind the middle, and two vague foveae, one in front of middle and the other near apical third.

Abdomen beneath sparsely, coarsely, shallowly punctate, sparsely clothed with long, recumbent, whitish hairs, with smooth lateral callosities, the intervals densely, finely granulose; last visible sternite broadly, rather deeply emarginate at apex (emargination truncate in middle), the lateral margins serrate; eighth tergite broadly rounded at apex, densely, coarsely punctate, densely granulose, but not longitudinally carinate. Prosternum coarsely, densely punctate, more or less transversely rugose, rather densely clothed with long, semierect, white hairs; anterior margin with a broad, very short, median lobe. Anterior femur with a short, obtuse tooth, which is dentate on outer margin. Anterior tibia slightly arcuate, with a small, emarginate dilation near apex; middle and posterior tibiae straight.

Length 5.2 mm., width 1.6 mm.

Female.—Differing from the male in having the head uniformly reddish cupreous, the antenna piceous, with a slight cupreous tinge, the last visible sternite serrate and broadly rounded at the apex, the prosternum smooth at the middle, and more sparsely pubescent, and the anterior tibia unarmed near the apex.

Redescribed from the male type and female allotype in the collection of W. J. Chamberlin.

Type locality.—Coconino County, Ariz.

DISTRIBUTION

From material examined:

Arizona: Coconino County, May, types (W. J. Chamberlin). Ashfork, June 18; Williams, May and June (Barber and Schwarz). Peach Springs, May 1934 (F. T. Scott).
California: Sunset Valley, Santa Barbara County, July 4, 1939 (W. F. Barr).
Colorado: Durango (E. J. Oslar).

Hosts.—The larval habits are not known, but E. A. Schwarz in his unpublished notes records the adults as being abundant on juniper (*Juniperus* sp.) at Ashfork, Ariz.

The specimens examined are rather uniform in coloration but vary considerably in the width and shape of the pronotum. The pronotum varies from nearly parallel-sided anteriorly to widest at the middle, with the sides regularly rounded. The broader specimens usually have the elytra widest behind the middle, whereas in the more cylindrical ones the sides of the elytra are parallel to behind the middle as in the type. The sculpture on the elytra is more or less variable as to the distinctness of the costae and foveae. The length is from 5 to 8 mm.

This species is very closely allied to *lixa* Horn, but in *arizonica* the clypeus is a little more deeply emarginate in front, and the hairs on the elytra are sparser and average less than one-tenth of a millimeter in length, whereas in *lixa* they average at least one-tenth of a millimeter. The males of *arizonica* usually have the apex of the last visible abdominal sternite more truncate at the middle, and the genitalia twice as long as in *lixa*, with the median lobe rounded at the apex.

(5) CHRYSOBOTHRIS DELETA LeConte

(Fig. 5; fig. 111, *E*)

Chrysobothris deleta LeConte, 1859, Amer. Phil. Soc. Trans. (n. s. 11: 255; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1424; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90; Horn, 1886, Amer. Ent. Soc. Trans. 13: 99–100, 120, pl. 5, figs. 150–154; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 211; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 118; 1907, Canad. Ent. 39: 238–239; Woodworth, 1913, Guide to California Insects, pp. 194, 196; Chamberlin, 1917, Ent. News 28: 139; 1925, N. Y. Ent. Soc. Jour. (1924) 32: 193 (separate, p. 192); 1926, Cat. Buprestidae North Amer., pp. 146–147; 1929, Pan-Pacific Ent. 5: 115.

Chrysobothris delecta Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 619 (typographical error for *deleta*.)

Chrysobothris subcylindrica Motschulsky, 1859, Soc. Imp. Nat. Moscou Bul. 32 (2): 182–183, pl. 4, fig. 17; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1428.

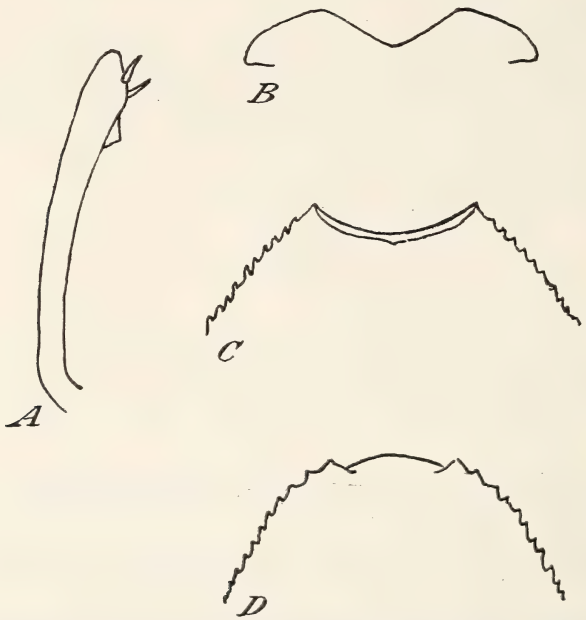

FIGURE 5.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris deleta*.

Female.—Broadly elongate, rather strongly convex above, moderately shining, uniformly piceous, with a faint purplish or bronzy tinge; beneath similar in color, but more strongly shining than above.

Head uniformly bronzy brown, with a vague, narrow chevron on vertex and a longitudinal carina on occiput; front nearly flat, with two indistinct, irregular, smooth callosities; surface coarsely, deeply, rather densely, irregularly punctate, clothed with a few long, erect, inconspicuous hairs, the intervals feebly granulose; clypeus broadly, rather deeply, arcuately emarginate in front, broadly rounded on each side. Antenna uniformly bronzy brown, compact, feebly narrowed to apex; intermediate segments slightly wider than long, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest at middle; sides regularly arcuately rounded; posterior angles subrectangular; anterior margin slightly sinuate, with a broad, rather strongly rounded, median lobe; base broadly, arcuately emarginate on each side, the median lobe strongly produced and broadly rounded; disk strongly convex, with

two more or less distinct, smooth, irregular callosities arranged transversely in front of middle; surface coarsely, rather densely, deeply, irregularly punctate, slightly rugose at sides, with a few rather long, erect, inconspicuous hairs, the intervals nearly smooth.

Elytra at base slightly wider than pronotum at middle, nearly twice as long as wide; sides nearly parallel from humeral angles to apical third (slightly expanded behind middle), then arcuately converging to the tips, which are separately broadly rounded; lateral margins finely serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface rather densely, finely, deeply, irregularly punctate, transversely rugose at sides, sparsely clothed with moderately long, semierect, white hairs. Each elytron with four more or less distinct longitudinal costae, the first distinctly elevated from apex to middle, the others less distinct and broadly interrupted, and with three broad, slightly depressed foveae, one in front of middle and two arranged subtransversely behind the middle.

Abdomen beneath sparsely, coarsely, but not deeply punctate, sparsely clothed with moderately long, recumbent, whitish hairs, the intervals slightly granulose, and each sternite with a smooth callosity on each side near lateral margin; last visible sternite broadly rounded and sinuate at apex, the lateral margins finely serrate; eighth tergite broadly rounded at apex, densely, coarsely, deeply punctate, densely granulose, but not longitudinally carinate. Prosternum coarsely, sparsely punctate, sparsely clothed with long, recumbent, white hairs; anterior margin with a broad, short, median lobe. Anterior femur with a large, acute tooth, which is strongly dentate on outer margin. Anterior tibia slightly arcuate; middle and posterior tibiae straight.

Length 7.5 mm., width 3 mm.

Redescribed from the female type, No. 2703, in the Museum of Comparative Zoology, Cambridge, Mass.

Male.—Differing from the female in having the head bright green in front, but becoming cupreous on the occiput, the antenna bronzy green, the prosternum more coarsely, densely punctured, the last visible sternite broadly, deeply, arcuately emarginate at apex, and anterior and middle tibiae expanded at apices, the former armed with a small tooth near apex.

Type locality.—Of *deleta*, "California;" of *subcylindrica*, Nova-Helvetia (Sacramento, Calif.). Type of *subcylindrica* in the Zoological Museum of the University of Moscow and not seen by the writer.

DISTRIBUTION

From material examined:

CALIFORNIA: No definite locality, type (A. Murray). Los Angeles County (D. W. Coquillett). San Diego (G. H. Field). Amedee, July 21–28, 4,200 feet (H. F. Wickham).
IDAHO: Pocatello, June 24 (E. S. G. Titus).
NEVADA: Reno, July 18 (H. F. Wickham).
OREGON: Cordon, July 8 (W. J. Chamberlin).
UTAH: South Creek, Beaver County, June 22.

The species has also been recorded in the literature from the following:

ARIZONA: No definite locality.
CALIFORNIA: Owens Valley, Palm Springs, Tallac, Freeman, Castella, Lake Tahoe, Azusa, Yuma, and Pasadena.
NEW MEXICO: Silver City.
UTAH: Virginia River.

Gemminger and Harold (1869) list *subcylindrica* from Alaska, but if its host is mesquite, this record must apply to some other species. Horn (1886) records it from Washington Territory, but the specimen under *deleta* in the LeConte collection is *mali*.

Hosts.—Woodworth (1913) records *deleta* as attacking mesquite (*Prosopis juliflora* (Swartz) De Candolle). Chamberlin (1925)

states that it is rare, and probably breeds in the twigs of yellow pine, but he (1926) simply gives the host as mesquite.

The sculpture on the dorsal surface of the body is somewhat variable, some specimens being more densely punctured than others, and the smooth callosities on the pronotum being sometimes absent. Some specimens have the longitudinal costae on the elytra more distinct, and the first costa extending to the base of the elytron. In most females examined the tip of the last visible sternite is transversely sinuate, with a broadly rounded median lobe, but in a few specimens it is subtruncate or slightly rounded. The prosternal lobe is also slightly variable in length. Horn (1886) mentions that one specimen before him has the body beneath entirely green, but this specimen was not seen by the writer and may have been erroneously identified.

This species resembles *deserta* Horn and the two species are confused in most collections. In *deleta* the form is more subcylindrical, the longitudinal costae on the elytra are elevated and interrupted by the foveae, and the abdominal sternites have smooth, lateral callosities, whereas in *deserta* the body is more depressed, the smooth longitudinal lines on the elytra are not elevated or interrupted, and the abdominal sternites are without smooth, lateral callosities.

Chamberlin (1926) gives the type locality as Owens Valley, Calif., but LeConte described the species from a unique female collected by A. Murray, and the holotype is simply labeled "Calif." LeConte does not mention Owens Valley in his description.

Horn (1886) places *subcylindrica* Motschulsky as a synonym of *deleta* and this has been followed by all later authors. The type of *subcylindrica* has not been seen by the writer and this synonymy must be accepted until the type can be studied.

(6) CHRYSOBOTHRIS CHAMBERLINI, new name

(Fig. 6; fig. 111, *F*)

Chrysobothris calcarata Chamberlin (not Melsheimer), 1938, Pan-Pacific Ent. 14: 12, figs. 9–11; Beer, 1940, Pan-Pacific Ent. 16: 16.

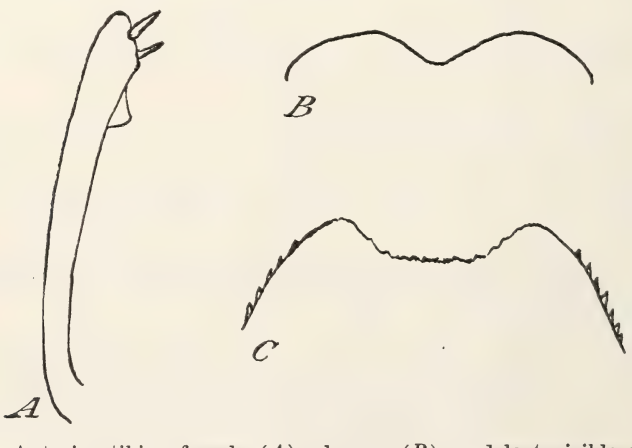

FIGURE 6.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) of *Chrysobothris chamberlini*.

Male.—Moderately elongate, strongly shining, bronzy brown with a faint cupreous tinge; beneath uniformly reddish cupreous, and more strongly shining than above.

Head bright green, becoming reddish cupreous on occiput, with a vague, longitudinal carina on occiput, an indistinct coppery chevron on vertex, and a smaller, vague, greenish chevron on the front; front nearly flat; surface coarsely, rather densely, uniformly punctate, sparsely clothed with short, semi-erect, inconspicuous hairs, the intervals nearly smooth; clypeus broadly, rather deeply, arcuately emarginate in front, broadly rounded on each side. Antenna bronzy green, gradually narrowed to apex; intermediate segments moderately compact, wider than long, subtruncate at outer margins; third segment slightly longer than fourth.

Pronotum nearly twice as wide as long, slightly wider at apex than at base, widest at middle; sides regularly rounded; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base slightly emarginate on each side, with the median lobe slightly produced and broadly rounded; disk moderately convex, with a vague, smooth, median line in front of scutellum, and a smooth, transverse space on each side near middle, but without distinct callosities or depressions; surface coarsely, rather densely punctate, slightly rugose toward sides, sparsely clothed with long, erect, inconspicuous hairs, intervals indistinctly granulose.

Elytra slightly wider than pronotum, twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions vaguely indicated; disk moderately convex; surface finely, densely, uniformly punctate, rather densely clothed with moderately long, erect, whitish hairs, the intervals densely, finely granulose. Each elytron with four rather vague, longitudinal costae, which are elevated posteriorly, extending from apex to base, and two indistinct foveae, one at basal third, the other behind middle.

Abdomen beneath sparsely, finely, irregularly punctate, sparsely clothed with short, recumbent, white hairs, more densely pubescent toward sides, with smooth lateral callosities, the intervals indistinctly granulose; last visible sternite broadly, rather deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins coarsely serrate; eighth tergite triangularly emarginate at apex, finely granulose, and coarsely, rather densely punctate. Prosternum densely, finely punctate toward sides, coarsely punctate at middle, more or less rugose, sparsely clothed with long, recumbent, white hairs, with a distinct, broad, short lobe in front. Anterior femur with a long, acute tooth, which is coarsely dentate on outer margin. Anterior tibia slightly arcuate, with a small, triangular tooth at apical fourth; middle and posterior tibiae straight.

Length 10 mm., width 3.5 mm.

Redescribed from the single male type in the collection of W. J. Chamberlin.

Female.—No females have been examined by the writer, but Beer (1940) records collecting three males and one female, and states that the female has the antenna coppery bronze, and the last visible abdominal sternite rather completely rounded at the apex, similar to that of *Chrysobothris harrisi* (Hentz).

Type locality.—Prescott, Ariz.

DISTRIBUTION

From material examined:

ARIZONA: Prescott, July 1923, holotype (W. J. Chamberlin).

Also recorded by Beer (1940) from near Wilderville, on the banks of the Applegate River, Oreg.

Hosts.—The larval habits are not known, but F. M. Beer collected the adults in Oregon on chaparral (*Ceanothus cuneatus* (Hooker) Nuttall).

This species is very closely allied to *deserta* and differs from it only in having the longitudinal costae on the elytra slightly elevated

posteriorly, the pubescence on the elytra sparser, the tooth on the anterior tibia of the male more triangular, and the sides of the male genitalia more parallel and not so strongly expanded. These two species resemble each other so closely that there may be some difficulty in separating some specimens, and they may prove to be the same species when sufficient material is available for study.

The name *calcarata* is preoccupied by a species described by Melsheimer from Pennsylvania.

(7) CHRYSOBOTHRIS BISINUATA Chamberlin

(Fig. 7)

Chrysobothris bisinuata Chamberlin, 1938, Pan-Pacific Ent. 14: 13, figs. 12–13.

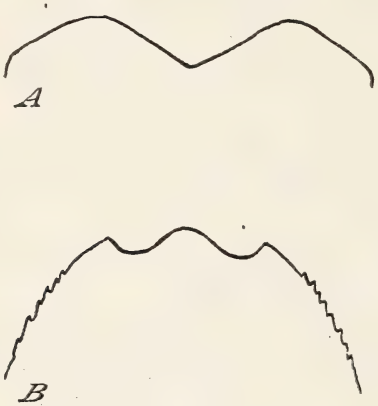

FIGURE 7.—Clypeus (*A*) and last visible abdominal sternite of female (*B*) of *Chrysobothris bisinuata*.

Female.—Moderately elongate, rather strongly shining, bronzy brown, with a distinct cupreous tinge.

Head uniformly brownish cupreous, with a vague, longitudinal carina on occiput and two small callosities on the front; front nearly flat; surface coarsely, densely, uniformly punctate, rather densely clothed with long, erect, inconspicuous hairs; clypeus deeply, broadly, triangularly emarginate in front, broadly rounded on each side. Antennae missing.

Pronotum one and three-fourths times as wide as long, subequal in width at base and apex, widest at middle; sides regularly rounded; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base broadly, arcuately emarginate on each side, the median lobe slightly produced and broadly rounded; disk moderately convex, without depressions or smooth callosities; surface slightly, transversely rugose, rather coarsely, densely punctate, sparsely clothed with long, erect, inconspicuous hairs, the intervals vaguely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins slightly serrate posteriorly; basal depressions rather deep and rounded; humeral depressions broad and very shallow; disk moderately convex; surface finely, rather densely punctate, rather densely clothed with moderately long, erect, fine hairs. Each elytron with four smooth, bluish-black, longitudinal costae, which are slightly elevated posteriorly; first extending from near apex to basal fourth; second and third extending from near apex to near base, and vaguely interrupted in front of middle and at apical third; fourth following outline of lateral margin from near apex to middle.

Abdomen beneath rather densely, finely punctate, sparsely clothed (more densely toward sides) with moderately long, semierect, white hairs, with smooth lateral callosities, intervals densely granulose; last visible sternite strongly

bisinuate at apex, without a submarginal ridge, lateral margins coarsely serrate; eighth tergite broadly rounded at apex, densely granulose, coarsely, sparsely punctate. Prosternum densely, coarsely punctate, sparsely clothed with long, erect, white hairs, with a distinct, broad, short lobe in front. Anterior femur with a long, acute tooth, which is coarsely dentate on outer margin. Anterior tibia strongly arcuate, unarmed; middle and posterior tibiae straight.

Length 9.5 mm., width 4 mm.

Type locality.—Willows, Calif.

Redescribed from the single female in the collection of W. J. Chamberlin, collected July 2, 1935, by H. A. Scullen.

Male.—Unknown.

This species is known only from the female holotype. It resembles *chamberlini* very closely, and since that species was known until recently by the male holotype only, the writer was inclined to place *bisinuata* as the female of *chamberlini*. Recently Mr. Beer collected three males and one female which he identified as *chamberlini* and he describes the female as having the last visible sternite rather completely rounded at the apex. Since the apex of the last visible sternite in the females of these two forms is quite different, it seems advisable to recognize *bisinuata* and *chamberlini* as valid species, at least until the males of both species are known and more material is available for study.

(8) Chrysobothris deserta Horn

(Fig. 8; fig. 112, *A*)

Chrysobothris deserta Horn, 1886, Amer. Ent. Soc. Trans. 13: 99, 100–101, pl. 5, figs. 155–158; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 211; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 118; 1907, Canad. Ent. 39: 239; Woodworth, 1913, Guide to California Insects, p. 196; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 149; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 621; Van Dyke, 1937, Brooklyn Ent. Soc. Bul. 32: 112.

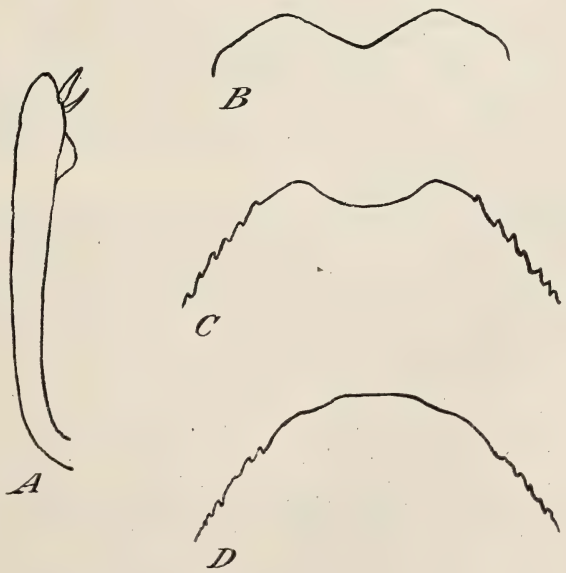

Figure 8.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris deserta*.

Male.—Broadly elongate, moderately convex above, feebly shining, uniformly brownish cupreous; beneath cupreous, with a distinct greenish tinge, and more strongly shining than above.

Head bright green in front, cupreous and aureous on vertex and occiput, with a vague, narrow chevron on vertex and a distinct longitudinal carina on occiput; front nearly flat, with two vague callosities; surface rather densely punctate, more coarsely, confluently on occiput, rather densely clothed with long, recumbent, white hairs, the intervals smooth; clypeus broadly, arcuately emarginate in front, arcuately rounded on each side. Antenna uniformly bronzy green, robust, short, vaguely narrowed to apex; intermediate segments not compact, as wide as long, broadly rounded at outer margins; third segment slightly shorter than the following two segments united.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest along middle; sides nearly parallel (feebly, arcuately converging anteriorly) to behind middle, slightly, arcuately constricted at posterior angles, which are nearly rectangular; anterior margin slightly sinuate, with a broad, feebly rounded, median lobe; base broadly, angularly emarginate on each side, the median lobe broadly rounded; disk moderately convex, more or less vaguely depressed anteriorly, with four smooth, irregular callosities arranged transversely in front of middle, and a smooth, indistinct, median line in front of scutellum; surface coarsely, confluently punctate, sparsely clothed with long, fine, recumbent, white hairs.

Elytra at base slightly wider than pronotum at middle, twice as long as wide; sides nearly parallel from humeral angles to behind middle (vaguely expanded behind middle), then arcuately converging to tips, which are separately broadly rounded; lateral margins slightly serrate posteriorly; basal depressions deep; humeral depressions broad and very shallow; surface coarsely, scabrously punctate, rather densely clothed with short, semierect, white hairs. Each elytron with four more or less smooth, longitudinal lines; first parallel with sutural margin, extending from basal fovea to apex; second strongly sinuate, extending from near base to near apex; third short, extending from basal third to apical third; and the fourth following outline of lateral margin, extending from humeral angle to near apex; and with two very indistinct discal foveae of the same color as surface of elytron, one on second smooth line at basal third, the other at apical third between second and third smooth lines.

Abdomen beneath finely, densely punctate, slightly, transversely rugose, rather densely, uniformly clothed with moderately long, recumbent, white hairs, without lateral callosities, the intervals finely granulose; last visible sternite broadly, shallowly, arcuately emarginate at apex, without a submarginal ridge, lateral margins finely serrate; eighth tergite broadly rounded at apex, densely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, rather densely clothed with long, semierect, white hairs; anterior margin deflexed, with a wide, short, median lobe. Anterior femur with a large, acutely triangular tooth, which is strongly dentate on outer margin. Anterior and middle tibiae slightly arcuate, the former with a small, rounded dilation near apex; posterior tibia straight.

Length 9.25 mm., width 3.75 mm.

Redescribed from the male lectotype, No. 3440, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the head uniformly brownish cupreous, and more coarsely punctured, the antenna uniformly piceous, the prosternum more coarsely and sparsely punctured, the last visible sternite longer, broadly rounded and slightly sinuate at apex, the middle tibia straight, and the anterior tibia unarmed near the apex.

Type locality.—Mojave Desert, Calif.

DISTRIBUTION

From material examined:

CALIFORNIA: Mojave Desert, lectotype (Horn collection). Kernville, May 14, 1930 (E. G. Linsley). Palm Springs, July 1936, reared (J. D. Maple). Lone Pine, Inyo County, June 1937 (C. D. Michener). Buttonwillow, May 29, 1936.

UTAH: St. George, July (H. F. Wickham).

Chamberlin (1926) records this species from San Diego and Owens Lake, Calif., and Obenberger (1934) lists it from Lower California.

Hosts.—The adults have been reared from the roots of *Atriplex* sp. collected at Palm Springs, Calif., by J. D. Maple.

Very little variation was found in the few examples available for study. The sides of the pronotum are usually more arcuately rounded than in the lectotype, and the smooth callosities on the pronotum are absent on some of the specimens. The discal foveae on the elytra are vaguely indicated in the type but are not present on the specimens from Kernville. The length is from 7 to 10 mm.

Horn (1886) states that he has seen only three males, but there are none in the LeConte collection and only the lectotype in the Horn collection. The second specimen in the Horn collection under *deserta* is not this species.

(9) CHRYSOBOTHRIS ATRIPLEXAE, new species

(Fig. 9; fig. 112, *B*)

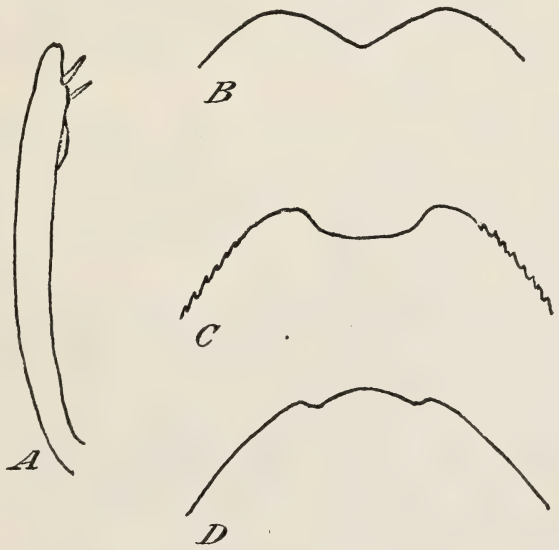

FIGURE 9.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris atriplexae.*

Male.—Broadly elongate, moderately convex above, rather strongly shining, bronzy green, with a distinct cupreous tinge; beneath cupreous, with faint greenish reflection.

Head bright bronzy green, with a narrow, longitudinal carina on occiput; surface densely, coarsely punctate, slightly rugose anteriorly, densely clothed with long, recumbent, white hairs; clypeus broadly, deeply, subangularly emarginate in front, broadly rounded on each side. Antenna bronzy green, with a faint cupreous tinge, nearly equal in width to apex; intermediate segments compact, as wide as long, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum three-fourths wider than long, subequal in width at base and apex, widest near middle; sides slightly, arcuately rounded, more strongly converging posteriorly; anterior margin sinuate, with a broad, slightly rounded, median lobe; base broadly, arcuately emarginate on each side, the median lobe broadly rounded and rather strongly produced; disk moderately convex, slightly un-

even, without depressions or smooth callosities, except for a smooth, triangular space on each side at base in front of elytral lobe, and a vague, smooth line in front of scutellum; surface coarsely, confluently punctate, finely granulose between punctures, rather densely clothed with long, recumbent, white hairs.

Elytra at base slightly wider than pronotum near middle, nearly twice as long as wide; sides parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate posteriorly; basal depressions broad and rather deep; humeral depressions elongate and shallow; surface coarsely, densely, scabrously punctate, rather densely clothed with short, semierect, white hairs. Each elytron with four distinct, more or less smooth, longitudinal lines; first parallel with sutural margin, extending from apex to basal fovea; second sinuate, extending from near base to apex; third short, extending backward from basal third and connected to second line near apical third; and fourth following outline of lateral margin, but without distinct discal foveae.

Abdomen beneath finely, densely punctate, rather densely clothed with moderately long, recumbent, white hairs, and white efflorescence, without lateral callosities; last visible sternite broadly, arcuately emarginate at apex, without a submarginal ridge, lateral margins coarsely serrate; eighth tergite slightly, broadly emarginate at apex, densely, coarsely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, finely granulose, rather densely clothed with long, semierect, white hairs; anterior margin slightly deflexed, with a wide, short, median lobe. Anterior femur with a large, acutely triangular tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae slightly arcuate, the former with a long, indistinct dilation near apex; posterior tibia straight.

Length 9 mm., width 3.5 mm.

Female.—Differing from the male in having the head brownish cupreous and more sparsely pubescent, the antenna brownish cupreous, slightly narrowed to apex, and the third segment distinctly longer than fourth, the last visible sternite broadly, transversely sinuate at apex, the eighth tergite broadly rounded at apex, and more densely punctured, the middle tibia straight, and the anterior tibia unarmed near apex. Length 11 mm., width 4 mm.

Type locality.—Death Valley, Calif.

Type material.—Type and allotype in the United States National Museum, No. 55292. Paratypes in the collection of William F. Barr.

Described from four specimens (one type). The type and allotype were cut from the heartwood of the desertholly (*Atriplex hymenelytra* (Torrey) Watson) by M. French Gilman, who reports them rather numerous in the branches of the holly, in some cases killing the plant; and two paratypes (which are not quite typical) collected by W. F. Barr, one at Thermal, Riverside County, Calif., June 18, 1940, and the other one at San Felipe Creek, Imperial County, Calif., June 17, 1940.

This species is closely allied to *deserta* Horn, but it differs from that species in having the upper surface of the body bronzy green, with a distinct cupreous tinge, the anterior tibia of the male not armed with a distinct dilation near the apex, and the sides of the male genitalia slightly, arcuately rounded, and not constricted toward the apex.

There are three specimens in the United States National Museum collected by H. F. Wickham during June at Hawthorn, Nev., which resemble this species but are not entirely typical. These specimens are smaller, more slender, and darker in color, and the pronotum is more coarsely punctured and has more or less distinct callosities. The anterior tibia of the male is like that of *atriplexae*, but the genitalia are slightly different. Since so few specimens are available at present, they are placed temporarily under this species, but may prove to be a distinct species when more material is available for study.

(10) Chrysobothris grindeliae Van Dyke

(Fig. 10; fig. 112, *C*)

Chrysobothris grindeliae Van Dyke, 1937, Brooklyn Ent. Soc. Bul. 32: 111–112.

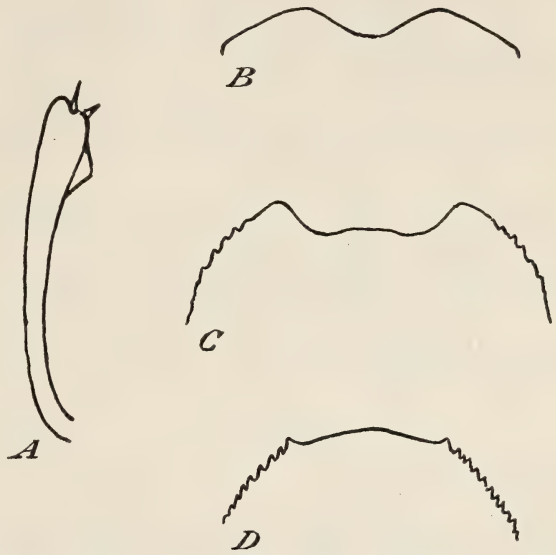

Figure 10.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris grindeliae*.

Male.—Broadly elongate, moderately convex above, rather strongly shining, uniformly bronzy brown, with a faint greenish tinge; beneath brownish cupreous, and more strongly shining than above.

Head bright green, becoming cupreous on occiput, with two vague, irregular, smooth callosities on front, and a vague, longitudinal carina on occiput; front nearly flat; surface densely, coarsely punctate, sparsely clothed with fine, semierect, inconspicuous hairs, intervals smooth; clypeus broadly, arcuately emarginate in front, broadly rounded on each side. Antenna bronzy green, gradually narrowed to apex; intermediate segments compact, transverse, subtruncate at outer margins; third segment subequal in length to fourth.

Pronotum two-thirds wider than long, subequal in width at base and apex, widest at middle; sides arcuately rounded, slightly more strongly converging posteriorly; posterior angles obtusely rounded; anterior margin moderately sinuate, with a broadly rounded, median lobe; base broadly, arcuately emarginate on each side, the median lobe broadly rounded; disk uniformly convex, vaguely gibbose laterally, with a vague, smooth callosity on each side of middle; surface coarsely, densely, irregularly punctate, slightly rugose at sides, sparsely clothed with long, erect, fine hairs, intervals indistinctly granulose.

Elytra at base slightly wider than pronotum at middle, twice as long as wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins slightly serrate posteriorly; basal depressions broad and deep; humeral depressions vaguely indicated; surface finely, densely, irregularly punctate, sparsely clothed with moderately long, fine, semierect hairs, intervals vaguely granulose. Each elytron with three indistinct, longitudinal costae and three vague foveae; a broad fovea in front of middle and two smaller ones near apical third.

Abdomen beneath rather densely, coarsely, irregularly punctate, sparsely, irregularly clothed with moderately long, recumbent and semierect, whitish hairs, without smooth lateral callosities, the intervals slightly granulose; last

visible sternite broadly emarginate at apex (emargination sinuate and transversely truncate at middle), the lateral margins strongly serrate; eighth tergite coarsely serrate and rather deeply, narrowly emarginate at apex, densely granulose and coarsely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, sparsely clothed with very long, erect, whitish hairs; anterior margin with a distinct, broad, short, median lobe. Anterior femur with a long, acute tooth, which is coarsely dentate on outer margin. Anterior tibia slightly arcuate, with a small, angular dilation near apex; middle and posterior tibiae straight.

Length 8 mm., width 2.8 mm.

Redescribed from a male paratype collected at the type locality, May 27, 1936, on the gum plant (*Grindelia robusta* Nuttall) by A. T. McClay.

Female.—Differing from the male in having the head uniformly brownish cupreous, the antenna brownish cupreous, with a vague greenish tinge, the prosternum more sparsely punctured and less densely pubescent, the last visible sternite broadly rounded at apex, the eighth tergite broadly rounded at apex, and the anterior tibia nearly straight and unarmed near apex.

Type locality.—Fairfield, Solano County, Calif.; type in the California Academy of Sciences.

DISTRIBUTION

From material examined:

CALIFORNIA: Fairfield, Solano County, May 27, 1936 (A. T. McClay). Tracy, San Joaquin County, June 2, 1920; Dixon, June 3, 1920 (E. P. Van Dyke). Marin County, August 16, 1937 (C. J. Drake and F. Andre).

Host.—The larval habits are not known, but since both A. T. McClay and E. P. Van Dyke collected the adults on the gum plant (*Grindelia robusta* Nuttall), it is probably the host plant for this species.

The color on the upper side of the body is slightly variable, and in some specimens is more greenish or cupreous than in the paratype. Only a few examples were available for study and in some of these the smooth callosities and gibbosities on the pronotum and front of the head were absent, and the anterior margin of the pronotum slightly sinuate, with the median lobe scarcely indicated. In the males the emargination at the apex of the last visible sternite is transversely truncate at the middle or regularly arcuate. The pubescence is slightly longer on the specimen from Marin County than on the paratypes. The length is from 6.5 to 9 mm.

This species is closely allied to *fragariae*, but it differs from that species in having the tooth on the anterior femur acute, the last visible sternite of the male broadly, shallowly emarginate at the apex, and the last visible sternite of the female transversely sinuate at the apex.

Van Dyke (1937) states that the pubescence is longer and finer on *grindeliae* than on *deleta*, *deserta*, *lixa*, *fragariae*, and *subpubescens* Fall (typographical error for *pubescens*) but this is not the case in the paratypes of *grindeliae* examined by the writer.

(11) Chrysobothris fragariae Fisher

(Fig. 11; fig. 112, *D*)

Chrysobothris fragariae Fisher, 1930, Ent. Soc. Wash. Proc. 32: 149–152; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 634; Chamberlin, 1934, Pan-Pacific Ent. 10: 36, 37; Van Dyke, 1937, Brooklyn Ent. Soc. Bul. 32: 112.
Chrysobothris sp. Riley, 1892, Insect Life 5: 17–18.
Chrysobothris pubescens anonymous, 1929, U. S. Dept. Agr. Off. Rec. 8 (24): 3 (misidentification); anonymous, 1929, U. S. Dept. Agr. Insect Pest Survey Bul. 9: 104, 138, 402 (misidentifications); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 646 (part).

Figure 11.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris fragariae*.

Male.—Broadly elongate, feebly depressed above, moderately shining, uniformly dark brown, with a more or less distinct bronzy-green or bronzy-cupreous tinge in different lights; beneath bronzy brown, and more strongly shining than above.

Head bronzy brown, with a vague, longitudinal carina on occiput; front nearly flat; surface densely, irregularly punctate, the punctures variable in size and well separated, sparsely clothed with long, very fine, semierect, whitish hairs, the intervals nearly smooth; clypeus broadly, rather deeply, angularly emarginate in front, broadly rounded on each side. Antenna uniformly bronzy brown, gradually narrowed to apex; intermediate segments compact, wider than long, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum three-fourths wider than long, subequal in width at base and apex, widest at middle; sides arcuately converging at apical angles, parallel at middle, obliquely converging behind middle to posterior angles; anterior margin strongly sinuate, with a broadly rounded, median lobe; base broadly, arcuately emarginate on each side, median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, without a median depression; surface rather densely, coarsely punctate, the punctures more or less confluent toward sides, sparsely clothed with moderately long, erect, inconspicuous hairs, the intervals finely, densely granulose.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides slightly diverging from humeral angles to apical third, then arcuately converging to tips, which are conjointly broadly rounded; lateral margins vaguely serrate; basal depressions small and moderately deep; humeral depressions not distinct; disk moderately convex, slightly uneven; surface finely, irregularly punctate, the punctures denser basally, more or less transversely rugose, sparsely, irregularly clothed with long, erect, whitish hairs, the intervals obsoletely granulose. Each elytron with three very vague foveae, one in front of middle and two near apical third, but without distinct longitudinal costae.

Abdomen beneath sparsely, coarsely punctate, sparsely clothed with long, recumbent, whitish hairs, intervals obsoletely granulose; last visible sternite deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins finely serrate; eighth tergite deeply, arcuately emarginate at apex, densely granulose, coarsely, sparsely punctate, but not longitudinally carinate. Prosternum densely, coarsely punctate, rather densely clothed with long, fine, semierect, whitish hairs, with a broad, rather long, strongly declivous lobe in front. Anterior femur with a short, obtusely triangular tooth, which is slightly dentate on outer margin. Anterior tibia slightly arcuate, with a rounded dilation near apex; middle and posterior tibiae straight.

Length 8 mm., width 3 mm.

Redescribed from the male type, No. 43175, in the United States National Museum.

Female.—Differing from the male in having the intermediate segments of the antenna less compact, the last visible sternite vaguely emarginate at apex, the eighth tergite broadly subtruncate at apex, and the anterior tibia unarmed near apex.

Type locality.—Grand Mound, Wash.

DISTRIBUTION

From material examined:

IDAHO: Coeur d'Alene, 1890, 1891 reared (H. T. Back). Moscow (J. M. Aldrich).
OREGON: Mt. McLaughlin, 8,000 feet, August 14, 1935 (Geo. Ferguson).
WASHINGTON: Grand Mound, March to July, reared; White Salmon, July 1930, reared (W. W. Baker). Easton (A. Koebele). Medical Lake, July 14, 1920 (R. C. Shannon). Ellensburg, July 16, 1933, reared (W. W. Baker). White Swan, July 4, 1932 (S. E. Crumb).

Hosts.—This species has been reared from cultivated strawberry plants (*Fragaria* sp.) collected at Grand Mound and White Salmon, Wash., by William W. Baker. It has also been recorded from crowns of strawberry plants collected at Coeur d'Alene, Idaho, by H. T. Black.

The specimens from the type locality are rather constant except in size and in the lateral margins of the last visible abdominal sternite, which are entire or distinctly serrate, but some examples from the other localities vary from the typical form in having the foveae and longitudinal costae on the elytra vaguely indicated, the lateral margins of the last visible abdominal sternite scarcely interrupted, the tips of the elytra separately rounded, the pronotum with a weak median depression and the sides regularly rounded, and the head with a vague chevron on the vertex and two vague, smooth spots on the front. The specimens from Idaho have the clypeus more shallowly emarginate in front, the eighth tergite of the male slightly emarginate, and the dilation on the anterior tibia of the male more elongate. The specimens from White Swan, Wash., are similar to the ones from Idaho, but are larger, subopaque, and more finely punctured. The length is from 6.4 to 9 mm.

(12) Chrysobothris pubescens Fall

(Fig. 12; fig. 112, *E*)

Chrysobothris pubescens Fall, 1907, Canad. Ent. 39: 238–239; Woodworth, 1913, Guide to California Insects, p. 196; Blaisdell, 1916, Pacific Coast Ent. Soc. Proc. 1: (pages not numbered); Chamberlin, 1917, Ent. News 28: 139; 1925, N. Y. Ent. Soc. Jour. (1924) 32: 193 (separate, p. 192); 1926, Cat. Buprestidae North Amer., p. 166; 1929, Pan-Pacific Ent. 5: 115; anonymous, 1929, U. S. Dept. Agr. Off. Rec. 8 (24): 3 (misidentification, =*fragariae*); anonymous, 1929, U. S. Dept. Agr. Insect Pest Survey Bul. 9, pp. 104, 138, 402 (=*fragariae*); Fisher, 1930, Ent. Soc. Wash. Proc. 32: 151: Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 646 (part); Chamberlin, 1934, Pan-Pacific Ent. 10: 36, 37.

Chrysobothris subpubescens Van Dyke, 1937, Brooklyn Ent. Soc. Bul. 32: 112 (error for *pubescens*).

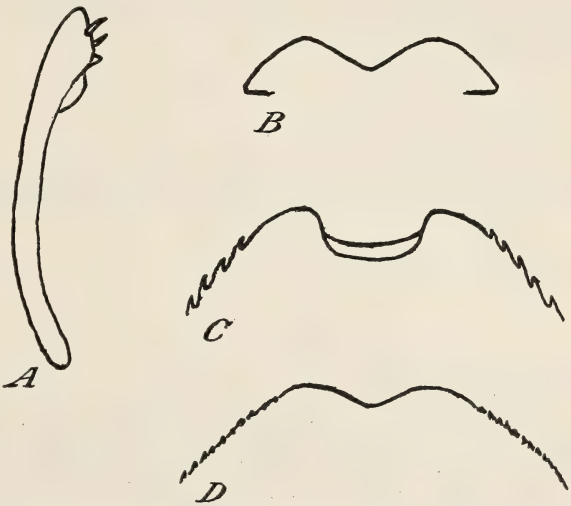

Figure 12.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris pubescens*.

Male.—Moderately elongate, slightly flattened above, faintly shining, bronzy brown, with a distinct purplish tinge; beneath bronzy brown, with a distinct purplish reflection in different lights, and more strongly shining than above.

Head bright green in front, becoming reddish cupreous on occiput, with a smooth, narrow, longitudinal carina on occiput; front nearly flat; surface coarsely, densely punctate, more or less rugose, rather densely clothed with long, erect, inconspicuous hairs; clypeus deeply, broadly, angularly emarginate in front, subtruncate on each side. Antenna piceous, with basal segments greenish, slightly narrowed to apex; intermediate segments slightly transverse, broadly rounded at outer margins; third segment subequal in length to fourth.

Pronotum nearly twice as wide as long, slightly wider at base than at apex, widest at middle; sides slightly, arcuately rounded (indistinctly parallel at middle); anterior margin strongly sinuate, with a broadly rounded median lobe; base broadly, arcuately emarginate on each side, the median lobe strongly produced and subtruncate in front of scutellum; disk slightly flattened, without callosities, but with a vague median depression; surface rather densely, coarsely, irregularly punctate, sparsely clothed with moderately long, erect, fine hairs.

Elytra at base distinctly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins finely serrate; basal depressions broad and moderately deep; humeral depressions broad

and very shallow; surface densely, finely punctate, more densely punctate and rugose basally, rather densely clothed with moderately long, erect, white hairs. Each elytron with three more or less distinct, vaguely elevated costae; first smooth, straight, distinct, extending along sutural margin from apex to in front of middle; second smooth, short, extending from median fovea backward but not reaching apex; third scarcely indicated, not smooth, and following outline of lateral margin; and with three slightly cupreous foveae, one on disk in front of middle, one behind middle toward lateral margin, and one at apical third interrupting first costa.

Abdomen beneath coarsely, sparsely punctate, smooth along posterior and anterior margins of segments, sparsely clothed with rather short, erect, inconspicuous hairs, and with smooth, indistinct, but not elevated, lateral callosities; last visible sternite broadly, deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins coarsely serrate; eighth tergite sparsely, coarsely punctate, broadly, shallowly, arcuately emarginate at apex. Prosternum coarsely, densely punctate, more or less rugose, sparsely clothed with long, recumbent, whitish hairs; anterior margin with a broad, short, median lobe. Anterior femur with a short angulated tooth, which is feebly dentate on outer margin. Anterior tibia arcuate, with a moderately long, rounded dilation at apex; middle and posterior tibiae straight.

Length 8.25 mm., width 3.25 mm.

Redescribed from the male type in the collection of H. C. Fall (Museum of Comparative Zoology).

Female.—Differing from the male in having the head uniformly reddish cupreous, the last visible sternite broadly, shallowly, arcuately emarginate at apex, the eighth tergite more densely, coarsely punctate, and anterior tibia unarmed at apex.

Type locality.—Mt. Wilson, Calif.

DISTRIBUTION

From material examined:

CALIFORNIA: Mt. Wilson, June 14–16, 1903, type series (H. C. Fall). Gray Meadow, Tulare County, June 1926 (H. F. Wickham); July 5, 1913.

Also recorded in the literature from the following localities:

CALIFORNIA: Sierra Madre; Lake Tahoe; Tuolumne and Shasta Counties. Fall (1907) records it as not rare in the Southern Sierras at altitudes of 3,000 to 6,000 feet.

OREGON: Mt. Jefferson, July 20, 7,500 feet (Chamberlin 1925).

Hosts.—The larval habits are not known, but Fall (1907) reports it as occurring most commonly on scrub oak (*Quercus dumosa* Nuttall), and Chamberlin (1917) records it as probably breeding in the smaller limbs of Jeffrey pine (*Pinus jeffreyi* "Oreg. Com.") and yellow pine (*Pinus ponderosa* Lawson).

Very little variation was observed in the few specimens examined. The foveae on the disk of the elytra vary in color from reddish cupreous to bronzy green. In the specimens from Gray Meadow the pronotum is widest in front of the middle and the lateral margins strongly converge posteriorly. The last visible abdominal sternite of the females is usually shallowly emarginate at the apex, but in a few examples it is vaguely notched. The front of the head is usually reddish cupreous in the females, but in one of the examples from Gray Meadow it is bronzy green with a distinct cupreous tinge. The length is from 7 to 9 mm.

This species is allied to *fragariae* Fisher, but it differs from that species in having the pubescence slightly longer and the foveae on the elytra very distinct.

(13) Chrysobothris oregona Chamberlin

(Fig. 13; fig. 112, *F*)

Chrysobothris oregona Chamberlin, 1934, Pan-Pacific Ent. 10: 38, 40, fig. 9.
Chrysobothris planomarginata Chamberlin, 1938, Pan-Pacific Ent. 14: 10–11, figs. 1–4. (New synonymy.)

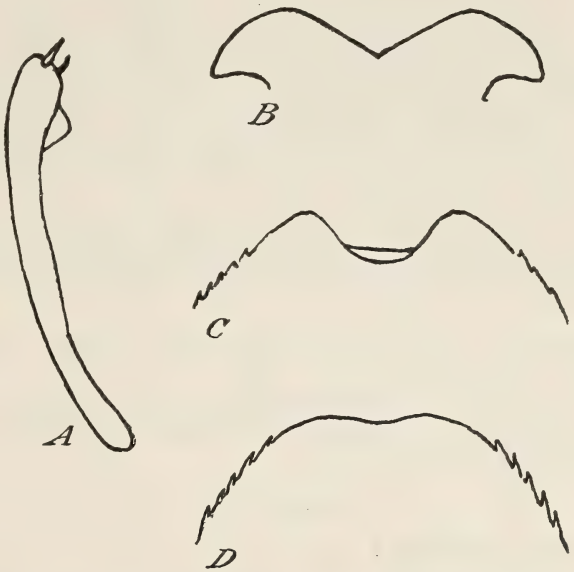

Figure 13.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris oregona*.

Male.—Broadly elongate, rather strongly convex above, moderately shining, uniformly bronzy brown, with a distinct cupreous tinge; beneath similar in color to dorsal surface, but more strongly shining.

Head bronzy green on front, becoming brownish cupreous on occiput, with a narrow, smooth, longitudinal carina on occiput; front nearly flat, with two small, irregular, smooth spaces; surface coarsely, rather densely, shallowly punctate, sparsely clothed with long, semierect, whitish hairs, intervals nearly smooth; clypeus broadly, rather deeply, angularly emarginate in front, broadly rounded on each side. Antenna uniformly bronzy green, scarcely narrowed to apex; intermediate segments wider than long, broadly rounded at outer margins; third segment slightly longer than second or fourth.

Pronotum twice as wide as long, slightly narrower at apex than at base, widest near apex; sides arcuately converging at apical angles, slightly converging posteriorly, and arcuately constricted near posterior angles, which are rectangular; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base angularly emarginate on each side, median lobe slightly produced and broadly rounded; disk more or less flattened, slightly uneven, with a vague, elongate, median depression, which does not extend to base or anterior margin; surface densely, finely, irregularly punctate, more or less rugose toward sides, sparsely clothed with short, erect, inconspicuous hairs.

Elytra at base subequal in width to pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins vaguely serrate posteriorly; basal depressions broad and deep; humeral depressions shallow; disk moderately convex; surface densely, coarsely, irregularly punctate, sparsely clothed with short, erect, white hairs, intervals obsoletely granulose. Each elytron with four more or less distinct, smooth, longitudinal costae, the first distinct from apex to basal fourth, second distinct on apical half, but becoming obsolete basally, third distinct at middle, obsolete

basally and apically, and fourth indistinctly indicated, following outline of lateral margin; and with three slightly depressed cupreous foveae, one interrupting second costa in front of middle, one between first and second costae at apical third, and the other interrupting third costa behind middle.

Abdomen beneath sparsely, finely, shallowly punctate, slightly rugose at sides of basal sternites, sparsely clothed with short, recumbent, white hairs, without distinct, smooth, elevated, lateral callosities, intervals obsoletely granulose; last visible sternite broadly, arcuately emarginate at apex, transversely truncate at middle of emargination, lateral margins distinctly serrate; eighth tergite rather deeply emarginate at apex, sparsely, coarsely punctate, densely granulose, but not longitudinally carinate. Prosternum coarsely, confluently punctate, sparsely clothed with long, semierect hairs; anterior margin with a broad, short, median lobe. Anterior femur with a short, obtusely triangular tooth, which is finely dentate on outer margin. Anterior tibia slightly arcuate, with a short, obtusely angulated dilation near apex; middle and posterior tibiae nearly straight, slightly dilated at apices.

Length 10.5 mm., width 4 mm.

Female.—Differing from male in having the head uniformly brownish cupreous, the last visible sternite broadly rounded and vaguely emarginate at apex, the eighth tergite broadly rounded at apex, and more finely punctured, the prosternum more sparsely punctured and with the pubescence shorter, and the anterior tibia unarmed at apex.

Redescribed from the male type and female allotype in the collection of W. J. Chamberlin.

Type locality.—Of *oregona*, Bull Prairie, Lake County, Oreg., July 27; of *planomarginata*, the same locality, July 24. Types in the collection of W. J. Chamberlin.

DISTRIBUTION

From material examined:

OREGON: Bull Prairie, 7,000 feet elevation, Lake County, July 24–27; Sparta, July 2 (W. J. Chamberlin).
WASHINGTON: Ellenburg, July 25, 1932, reared (William W. Baker).

Chamberlin (1938) records it from Grant County, Oreg.

Host.—This species has been reared from geranium (*Geranium* sp.) by William W. Baker.

Very little variation was observed in the few examples examined, except that the lateral margins of the last visible sternite are either entire or slightly serrate.

Dr. Chamberlin has kindly lent the types of both species to the writer for study, and from the examination of these types the writer is unable to separate *planomarginata* from *oregona*. The types of *oregona* are slightly larger than those of *planomarginata*, but there is considerable variation in the size of a series of the closely allied *fragariae* reared from strawberry plants. In the male type of *planomarginata* the lateral margins of the last visible sternite are entire, whereas in the female type of that species the sides are slightly serrate as in the types of both sexes of *oregona*. The genitalia and the tooth on the anterior tibia of the males of both species are alike.

This species is very closely allied to *fragariae* Fisher, but on account of the small number of specimens available for study the two species are considered as valid for the present. In the specimens examined the male genitalia of the two species are alike, but the tooth on the anterior tibia of the male of *oregona* is more angulated at the apex, and the costae on the elytra are more distinct, than in *fragariae*.

(14) Chrysobothris mali Horn

(Fig. 14; fig. 113, *A*)

Chrysobothris mali Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 97, pl. 5, figs. 135–139; Cook, 1896, Calif. Cult. 10: 362–363, figs. 1–2; 1896, Rural Californian 19: 66; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 117–118; Wickham, 1902, Iowa Univ. Lab. Nat. Hist. Bul. 5: 268; Cockerell, 1902, U. S. Dept. Agr., Div. Ent. Bul. (n. s.) 37: 108; Gibson, 1912, Ent. Soc. Ontario Ann. Rpt. (1911) 42: 100; Burke, 1917, Jour. Econ. Ent. 10: 328; Chamberlin, 1917, Ent. News 28: 139; Van Dyke, 1918, Ent. News 29: 58; Herbert, 1919, Jour. Econ. Ent. 12: 337; Lovett and Fulton, 1920, Oreg. Agr. Expt. Sta. Cir. 22: 54–55, fig. 36; Lovett, 1923, Oreg. Agr. Expt. Sta. Cir. 39: 3–5, figs. 1–2; Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 192 (separate, p. 193); 1926, Cat. Buprestidae North Amer., pp. 162–163; 1929, Pan-Pacific Ent. 5: 93, 115; Burke and Böving, 1929, U. S. Dept. Agr. Tech. Bul. 83: 1–36, figs. 1–12 (important paper); Chamberlin, 1934, Pan-Pacific Ent. 10: 39, fig. 7; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 640–641; Keen, 1938, U. S. Dept. Agr. Misc. Pub. 273: 36.

The foregoing list is not complete, only the more important papers having been cited.

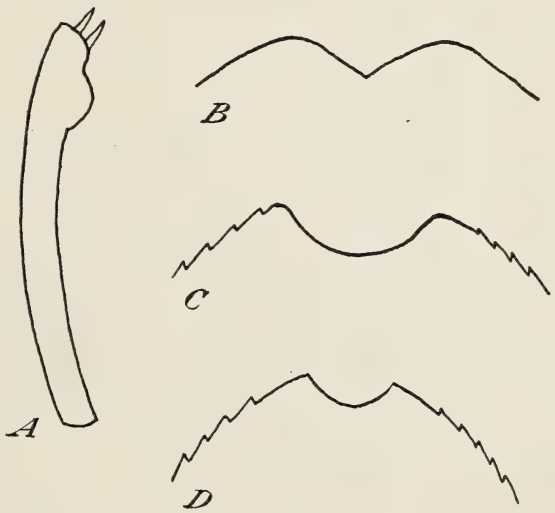

Figure 14.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris mali*.

Male.—Broadly elongate, strongly depressed above, moderately shining, greenish black to reddish cupreous; beneath reddish purple, and more strongly shining than above.

Head bronzy green, more or less reddish cupreous, with a smooth, longitudinal carina on occiput, a vague chevron on vertex, and two small, smooth spots on front; front slightly convex; surface coarsely, deeply, densely punctate, sparsely clothed with short, recumbent, white hairs, the intervals finely, densely granulose; clypeus broadly, deeply, angularly emarginate in front, broadly rounded on each side. Antenna bronzy, gradually narrowed to apex; intermediate segments about as long as wide, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum twice as wide as long, subequal in width at base and apex, widest near apex; sides parallel at middle, arcuately converging at apex, arcuately constricted at base; anterior margin strongly sinuate, with a broadly rounded median lobe; base deeply, arcuately emarginate on each side, the median lobe strongly produced and broadly rounded; disk moderately convex, uneven, with a distinct, longitudinal, median sulcus, and a shallow depression on each side

along lateral margin; surface coarsely, densely, deeply punctate, rugose toward sides, clothed with a few short, inconspicuous hairs, intervals indistinctly granulose.

Elytra distinctly wider than pronotum, three-fourths longer than wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions deep; humeral depressions shallow; disk more or less uneven, subdepressed; surface coarsely, rather densely punctate, sparsely clothed with short, inconspicuous hairs, the intervals densely granulose. Each elytron with three or four more or less distinct longitudinal costae, only the first strongly elevated posteriorly; and with three densely punctured foveae, the first between first and second costae, the second at end of third costa, and the third near middle interrupting second costa.

Abdomen beneath sparsely, coarsely, irregularly punctate, sparsely clothed toward sides with short, recumbent, whitish hairs, with smooth lateral callosities, the intervals finely, densely granulose; last visible sternite semicircularly emarginate at apex, without a submarginal ridge, lateral margins coarsely serrate; eighth tergite triangularly emarginate at apex, densely granulose, coarsely, sparsely punctate, but not longitudinally carinate. Prosternum coarsely, densely punctate, sparsely clothed with long, recumbent, whitish hairs, with a broad, short lobe in front. Anterior femur with a broad, obtuse tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae arcuate, the former with a rounded dilation near apex; posterior tibia straight.

Length 9.75 mm., width 4.5 mm.

Redescribed from the male lectotype, No. 3438, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the head uniformly reddish cupreous, the last visible sternite with a much smaller arcuate emargination at apex, the eighth tergite subtruncate at apex, the anterior tibia unarmed near apex, and the middle tibia straight.

Type locality.—California. No definite locality.

Distribution.—This species is widely distributed west of the Rocky Mountains, where it is more common than the eastern *femorata*. Material has been examined from Alberta, Canada, and various localities in the following States: Arizona, California, Colorado, Nevada, Oregon, and Utah. It has also been recorded in the literature from Minnesota, New Mexico, Texas, and Washington, and from Manitoba, Canada, but no specimens have been examined from these regions, and there is some doubt as to the identifications of some of the specimens from which these records were taken.

Hosts.—*Chrysobothris mali* attacks many kinds of deciduous trees and shrubs and has been recorded in the literature from the following hosts: Box elder (*Acer negundo* L.), silver maple (*Acer saccharinum* L.), red maple (*Acer rubrum* L.), bigleaf maple (*Acer macrophyllum* Pursh), sycamore maple (*Acer pseudoplatanus* L.), red willow (*Salix laevigata* Bebb), weeping willow (*Salix babylonica* L.), white willow (*Salix lasiolepis* Bent.), Meyer's globular-headed willow (*Salix matsudana* var. *umbraculifera* Rehd.), American elm (*Ulmus americana* L.), Camperdown elm (*Ulmus glabra* var. *camperdownii* Rehd.), Huntingdon elm (*Ulmus hollandica* var. *vegeta* Rehd.), Lombardy poplar (*Populus nigra italica* Du Roi), eastern cottonwood (*Populus deltoides* Marsh.), California sycamore (*Platanus racemosa* Nutt.), Oriental plane (*Platanus orientalis* L.), European horsechestnut (*Aesculus hippocastanum* L.), European mountain ash (*Sorbus aucuparia* L.), copper beech (*Fagus sylvatica* var. *atropunicea* West), California black oak (*Quercus kelloggii* Newb.), coast live oak (*Quercus agrifolia* Née), manzanita (*Arctostaphylos tomentosa* (Pursh) Douglas), alder-leaf mahogany

(*Cercocarpus alnifolius* Rydb.), mesquite (*Prosopis juliflora* (Swartz) De Candolle), apple (*Malus* sp.), plum (*Prunus domestica* L.), Pacific plum (*Prunus subcordata* Benth.), sweet cherry (*Prunus avium* L.), hollyleaf cherry (*Prunus ilicifolia* (Nutt.) Walpers), apricot (*Prunus armeniaca* L.), sour cherry (*Prunus cerasus* L.), Myrobalan plum (*Prunus cerasifera* Ehrh.), almond (*Prunus communis* (L.) Fritsch), English laurel (*Prunus laurocerasus* L.), Japanese weeping cherry (*Prunus subhirtella* var. *Shidarehigan* Hort.), Japanese flowering cherry (*Prunus serrulata* Lindl.), peach (*Amygdalus persica* L.), loquat (*Eriobotrya japonica* Lindl.), coffeeberry or cascara (*Rhamnus purshiana* De Candolle), hollyleaf buckthorn (*Rhamnus crocea* Nutt.), Christmasberry (*Photinia serrulata* Lindl.), oso berry (*Osmaronia cerasiformis* (Torr. and Gray) Greene), white alder (*Alnus rhombifolia* Nutt.), madroña (*Arbutus menziesii* Pursh), blue gum (*Eucalyptus globulus* Labill.), Jim brush (*Ceanothus sorediatus* Hook and Arn.), cultivated currant (*Ribes rubrum* L.), chaparral pea (*Pickeringia montana* Nutt.), cultivated rose (*Rosa* sp.), loganberry (*Rubus loganobaccus* Bailey), raphiolepis (*Raphiolepis japonica* Sieb and Zucc.), thorn (*Crataegus carrierei* Vauv.), firethorn (*Pyracantha coccinea* var. *lalandii* Dipp.), quince (*Cydonia oblonga* Mill.), trailing cotoneaster (*Cotoneaster horizontalis* Decne.), and Chinese wistaria (*Wistaria sinensis* Sweet).

This species shows considerable variation in coloration and in the shape of the pronotum, the color on the upper surface of the body varying from brownish black to a rather uniform coppery red. The pronotum is usually widest near the apical angles, with the sides converging posteriorly or parallel along the middle, whereas in some examples it is widest at the middle, with the sides regularly rounded. The sculpture on the elytra is more or less variable as to distinctness of the costae and foveae, and in the reddish examples the cupreous foveae are less distinct because they are of the same color as the surface of the elytra. The median sulcus on the pronotum is usually distinct, but occasionally it is only vaguely indicated. In most specimens examined the prosternal lobe is broad and very short, but in a few it is rather narrow and much longer. The dilation on the anterior tibia of the male is slightly variable; usually it is slightly narrowed toward the apex, but occasionally a specimen is found in which the dilation is more arcuately rounded because the tibia is more strongly narrowed toward the apex. The tip of the last visible sternite of the female in the typical form is narrowly, semicircularly emarginate, whereas in other material it varies to only vaguely emarginate. The length is from 6.5 to 11 mm.

This is one of the worst enemies of newly planted deciduous trees and shrubs on the Pacific slope and is known as the Pacific flatheaded borer. Many newly planted trees and shrubs are killed the first year. It is impossible to exterminate this insect since it attacks a great many varieties of indigenous trees and shrubs, as well as introduced plants. For an extensive account of its habits, the paper by Burke and Böving (1929) should be consulted.

Horn (1886) in his original description records the specimens from the Sacramento Valley sent to him by L. E. Ricksecker as infesting apple trees, and also others collected in Owen's Valley. Chamberlin (1926) gives the type locality as Owen's Valley, but the specimens in

the Horn and LeConte collections are simply labeled "Cal." without any definite locality.

(15) Chrysobothris lineatipennis Van Dyke

(Fig. 15)

Chrysobothris mali var. *lineatipennis* Van Dyke, 1916, Ent. News 27: 411; Burke, 1919, Jour. Econ. Ent. 12: 328 (= *beyeri* Schaeffer and *bacchari* Van Dyke); Chamberlin, 1926, Cat. Buprestidae North Amer., p. 163 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 641 (part).

Chrysobothris lineatipennis Van Dyke, 1923, Brooklyn Ent. Soc. Bul. 18: 40; Chamberlin, 1934, Pan-Pacific Ent. 10: 39.

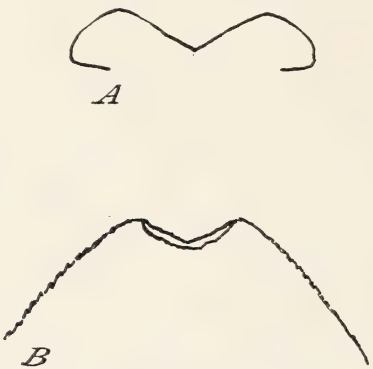

Figure 15.—Clypeus (*A*) and last visible abdominal sternite of the female (*B*) of *Chrysobothris lineatipennis*.

Female.—Broadly elongate, strongly depressed above, rather strongly shining; head and pronotum brillant reddish cupreous; elytra bronzy brown, with a faint reddish tinge; beneath brownish cupreous, with a faint greenish reflection, and more strongly shining than above.

Head with a smooth longitudinal carina on occiput, a broad chevron on vertex, and two small, smooth spots on front; front slightly convex; surface coarsely, rather densely punctate, sparsely clothed with short, semierect, inconspicuous hairs, intervals finely granulose; clypeus broadly, deeply, triangularly emarginate in front, broadly rounded on each side. Antenna bronzy brown, gradually narrowed to apex; intermediate segments slightly wider than long, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum twice as wide as long, subequal in width at base and apex, widest near apex, sides arcuately converging at apical angles, slightly converging from near apical angles to behind middle, and more strongly constricted at base; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base broadly, arcuately emarginate on each side, the median lobe slightly produced and broadly rounded; disk moderately convex, without callosities or median sulcus; surface coarsely, deeply, irregularly punctate, slightly rugose toward sides, intervals granulose.

Elytra distinctly wider than pronotum, twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions shallow; disk moderately convex; surface coarsely, rather densely punctate, clothed with a few inconspicuous hairs, intervals obsoletely granulose. Each elytron with four strongly elevated, longitudinal costae; first extending from apex to basal fovea; second extending from base and joined to third at apical fourth; third extending from humerus to near apex; fourth not smooth, following outline of lateral margin.

Abdomen beneath sparsely, coarsely, irregularly punctate, sparsely clothed with short, semierect, white hairs, with smooth lateral callosities, intervals finely, densely granulose; last visible sternite shallowly emarginate at apex, without a submarginal ridge, lateral margins coarsely serrate; eighth tergite broadly

rounded at apex, densely granulose, coarsely, densely punctate. Prosternum coarsely, densely punctate, sparsely clothed with short, recumbent, whitish hairs, with a broad, short lobe in front. Anterior femur with a broad triangular tooth, which is coarsely dentate on outer margin. Anterior tibia arcuate, unarmed; middle and posterior tibiae straight.

Length 8.5 mm., width 3.5 mm.

Redescribed from a female in the collection of W. J. Chamberlin, collected at Elsinore, Calif., during May 1931, and identified by Dr. Van Dyke.

Male.—Not seen.

Type locality.—Santa Monica hills, near Santa Monica, Calif.; type in the California Academy of Sciences.

Hosts.—The larval habits of this species are not known. Chamberlin (1926) gives the hosts as *Baccharis sergiloides* Gray and *Baccharis pilularis* De Candolle, but these records are from misidentified specimens and should apply to *beyeri* and *bacchari.*

The only specimen seen by the writer is the female from which the above redescription was made.

(16) Chrysobothris beyeri Schaeffer

(Fig. 16; fig. 113, *B*)

Chrysobothris beyeri Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 207; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 139; 1934, Pan-Pacific Ent. 10: 36, 40, fig. 10; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 612.

Chrysobothris bacchari Van Dyke, 1923, Brooklyn Ent. Soc. Bul. 18: 38–40 (part); Chamberlin, 1926, Cat. Buprestidae North Amer., p. 139 (part).

Chrysobothris mali var. *lineatipennis* Van Dyke, 1919, Jour. Econ. Ent. 12: 328 (part); Chamberlin, 1926, Cat. Buprestidae North Amer., p. 163 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 641 (part).

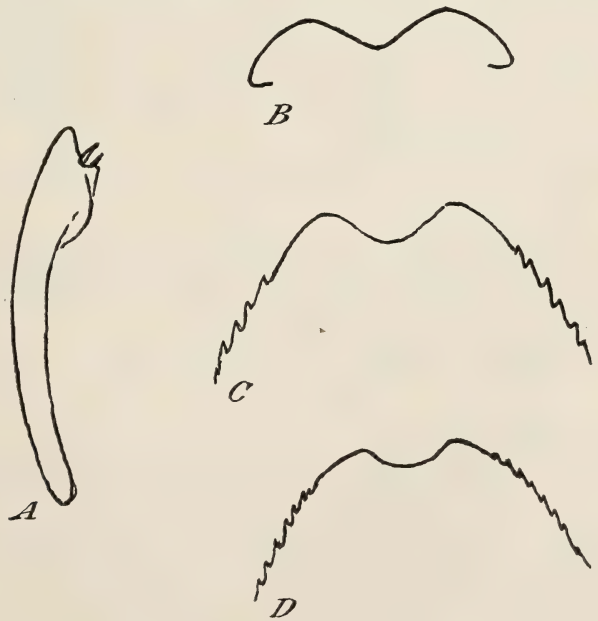

Figure 16.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris beyeri.*

Male.—Robust, moderately convex above, rather strongly shining; head and pronotum cupreous; elytra bronzy brown, with a faint cupreous tinge in different lights; beneath uniformly brownish cupreous.

Head uniformly cupreous, with a narrow, longitudinal carina on occiput, the carina bifurcate on vertex; front slightly convex, with two vague callosities; surface densely, finely granulose, coarsely, but not deeply, confluently punctate, more or less transversely rugose behind clypeus, sparsely clothed with long, semierect, inconspicuous, cinereous hairs; clypeus broadly, deeply, arcuately emarginate in front, broadly rounded on each side. Antenna uniformly cupreous, gradually narrowed to apex; intermediate segments as long as wide, broadly rounded at outer margins; third segment one-third longer than fourth.

Pronotum twice as wide as long, subequal in width at base and apex, widest along middle; sides parallel and slightly sinuate along middle, slightly converging at base and apex; anterior margin slightly sinuate, with an obscurely rounded, median lobe; base broadly, angularly emarginate on each side, median lobe broadly rounded; disk moderately convex, with a broad, shallow, elongate, median depression, and a moderately deep, rounded depression on each side near apical angle; surface rather densely but not very coarsely, irregularly punctate, transversely rugose, sparsely clothed with short, inconspicuous hairs.

Elytra slightly wider than pronotum at base, nearly twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately narrowly rounded; lateral margins distinctly serrate posteriorly; basal depressions deep; humeral depressions broad and shallow; surface indistinctly pubescent, finely, densely punctate, transversely rugose between costae. Each elytron with four smooth, longitudinal costae; first straight, extending from base to apex, more strongly elevated posteriorly; second sinuate, extending from base to near apex, interrupted in front of middle by a slightly depressed fovea; third short, arcuate, extending from basal fourth to apical fourth, interrupted at apical third by a slightly depressed fovea; fourth extending along lateral margin from apex to basal fourth, where it is joined to the third costa.

Abdomen beneath densely, indistinctly granulose, coarsely, sparsely punctate, rather sparsely clothed with recumbent, cinereous hairs, and with smooth, elevated, lateral callosities; last visible sternite deeply, arcuately emarginate at apex, lateral margins strongly serrate; eighth tergite coarsely punctate, but not longitudinally carinate, upper margin slightly emarginate at apex. Prosternum coarsely, rather densely punctate, rather densely clothed with long, recumbent, whitish hairs; anterior margin with a broad, very short, median lobe. Anterior femur with a large, obtusely triangular tooth, which is strongly dentate on outer margin. Anterior tibia arcuate, with a broad dilation at apex, the dilation nearly one-third as long as tibia and narrowed at apex; middle and posterior tibiae straight, the former abruptly dilated at apex.

Length 11.5 mm., width 4.75 mm.

Redescribed from the male lectotype, No. 42637, in the United States National Museum.

Female.—Differing from the male in having the head more sparsely punctured and less densely pubescent, the prosternum sparsely punctured, the last visible sternite broadly, shallowly emarginate at apex, the eighth tergite slightly rounded or subtruncate at apex, and confluently punctured, and the anterior and middle tibiae unarmed at their apices.

Type locality.—San Felipe, Lower California.

DISTRIBUTION

From material examined:

ARIZONA: Sabino Canyon, March 1917, April 1918, and June 1919, reared (G. Hofer). Hot Springs, June 24 (Barber and Schwarz). Globe (D. K. Duncan).

LOWER CALIFORNIA: San Felipe, May to August 1901; Santa Rosa (G. Beyer).

Hosts.—Beyer reported this species very abundant on willow (*Salix* sp.) during the dry season in May and June at San Felipe,

Lower California, and Burke reared it from *Baccharis sergiloides* Gray collected by G. Hofer in Sabino Canyon, Ariz.

The sculpture on the dorsal surface of the body is rather constant, but the color is more cupreous, especially on the head and pronotum, in some specimens than in others. The sides of the pronotum are usually parallel and slightly sinuate at the middle, but occasionally specimens are found that are widest at the middle with the sides arcuately rounded. The length is from 10.5 to 13.5 mm.

(17) Chrysobothris bacchari Van Dyke

(Fig. 17; fig. 113, *C*)

Chrysobothris bacchari Van Dyke, 1923, Brooklyn Ent. Soc. Bul. 18: 38–40 part); Chamberlin, 1926, Cat. Buprestidae North Amer., p. 139 (part); Burke and Böving, 1929, U. S. Dept. Agr. Tech. Bul. 83: 2–3; Linsley and Usinger, 1934, Pan-Pacific Ent. 10: 105; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 611; Chamberlin, 1934, Pan-Pacific Ent. 10: 36, 40.
Chrysobothris mali var. *lineatipennis* Van Dyke, 1919, Jour. Econ. Ent. 12: 328 (part); Chamberlin, 1926, Cat. Buprestidae North Amer., p. 163 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 641 (part).

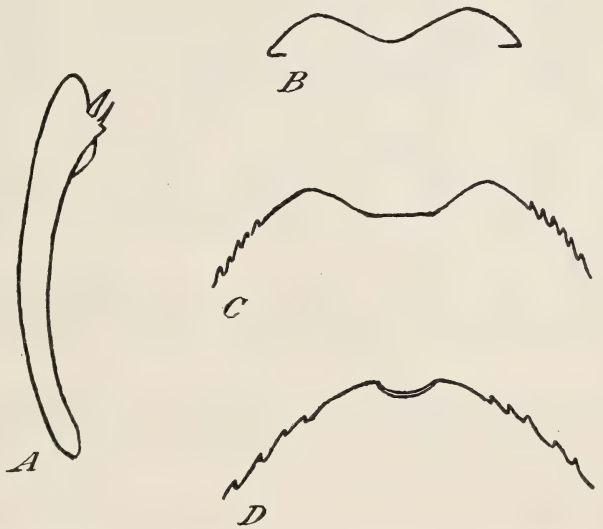

Figure 17.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris bacchari*.

Male.—Broadly elongate, strongly depressed above, rather strongly shining, bronzy brown; beneath brownish cupreous, and more strongly shining than above.

Head cupreous, slightly greenish along anterior margin of clypeus, with a smooth, Y-shaped carina on occiput and vertex; front slightly convex, with two vague callosities; surface rather finely, shallowly, irregularly punctate, sparsely clothed with long, semierect, whitish hairs, intervals finely granulose; clypeus broadly, rather deeply, arcuately emarginate in front, broadly rounded on each side. Antenna uniformly brownish cupreous, slightly narrowed to apex; intermediate segments in part slightly longer than wide, broadly rounded at outer margins; third segment slightly longer than fourth, which is subtriangular.

Pronotum twice as wide as long, subequal in width at base and apex, widest along middle; sides parallel at middle, obliquely converging anteriorly and posteriorly; anterior margin slightly sinuate, with an indistinct, broadly rounded, median lobe; base rather strongly, arcuately emarginate on each side, the median lobe moderately produced and broadly rounded; disk moderately convex, broadly, longitudinally depressed toward the sides, with a shallow, rather distinct, longitudinal, median sulcus; surface finely, sparsely punctate, more or less transversely rugose, and with a few indistinct hairs.

Elytra slightly wider than pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins finely serrate; basal and humeral depressions elongate and rather deep; disk rather strongly convex and uneven; surface very sparsely clothed posteriorly with short, erect, inconspicuous hairs, sparsely, finely, irregularly punctate, intervals indistinctly granulose. Each elytron with four longitudinal costae; first one obsolete basally, sharply defined on apical two-thirds, and gradually curving away from the suture posteriorly; second broken up into three portions by two shallow foveae, basal part short and irregular, the median part straight and distinct, occupying middle third of elytron, and the apical part distinct, not reaching tip of elytron; third extending from humerus (curving obliquely inward) to beyond middle of elytron, where it ends at a large fovea; and fourth scarcely defined, extending along lateral margin from near humerus to near the tip of the second costa.

Abdomen coarsely, shallowly, irregularly punctate, sparsely at middle, more densely toward sides, where it is more or less rugose, sparsely clothed with moderately long, recumbent, white hairs, with more or less distinct lateral callosities, intervals indistinctly granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, with a few sharp asperities at sides, lateral margins serrate; eighth tergite slightly emarginate or subtruncate at apex, sparsely, coarsely punctate, but not longitudinately carinate. Prosternum coarsely, densely punctate, sparsely clothed with long, recumbent, white hairs, with a broad, short lobe in front. Anterior femur with a broad, obtusely triangular tooth, which is dentate on outer margin. Anterior tibia slightly arcuate, with a short, rounded dilation at apex, the dilation not one-fourth as long as tibia; middle and posterior tibiae straight, middle pair abruptly expanded at apex.

Length 9 mm., width 3.8 mm.

Redescribed from the male paratype in the California Academy of Sciences, reared from "chaparral broom" (*Baccharis pilularis* De Candolle) collected at the type locality, June 27, 1919, by H. E. Burke.

Female.—Differing from the male in having the head more coarsely punctured, the last visible sternite shallowly, arcuately emarginate at apex, the prosternum more sparsely and finely punctured, and the tibiae unarmed at their apices.

Type locality.—Los Gatos, Calif.; type in the California Academy of Sciences.

DISTRIBUTION

From material examined:

CALIFORNIA: Los Gatos, June-July 1917, reared (F. B. Herbert and H. E. Burke). Laurel, June 27, 1918 (F. B. Herbert). Mill Valley, Marin County, July 19, 1925 (H. H. Kiefer). Santa Cruz Mountains (A. Koebele).

Also recorded in the literature from:

CALIFORNIA: Fairfax, Marin County, June 24, 1908 (E. C. Van Dyke). Mt. Tamalpais, Marin County, April (Linsley and Usinger).

Hosts.—H. E. Burke reared this species from "chaparral broom" (*Baccharis pilularis* De Candolle), a very common and worthless shrub of the family Compositae.

Very little variation was observed in the small series of specimens examined, except in size, which ranges from 8.5 to 11 mm. in length.

Chrysobothris bacchari can scarcely be separated from *beyeri* Schaeffer, but since Los Gatos is the type locality for *bacchari*, the name is retained for the specimens from California. The specimens of *bacchari* examined average smaller in size than those of *beyeri*, are more uniformly bronzy brown, with only a vague cupreous reflection, and the pubescence on the elytra is only slightly indicated toward the apices. The male genitalia are similar in the two species, but in the male of *beyeri* the dilation on the anterior tibia is nearly one-third the length of the tibia, whereas in *bacchari* it is not one-fourth as long as the tibia.

Van Dyke (1923) includes specimens from Arizona, which are *beyeri* Schaeffer, in his original description of *bacchari*.

(18) Chrysobothris purpurata Bland

(Fig. 18.)

Chrysobothris purpurata Bland, 1864, Ent. Soc. Phila. Proc. 3: 66–67; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1427; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90; Horn, 1880, Amer. Ent. Soc. Trans. 8: xi.
Chrysobothris aeneola Horn, 1886, Amer. Ent. Soc. Trans. 13: 109, 113–114, 121 (part); Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 206 (part); Chamberlin, 1926, Cat. Buprestidae North Amer., p. 137 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 609 (part).

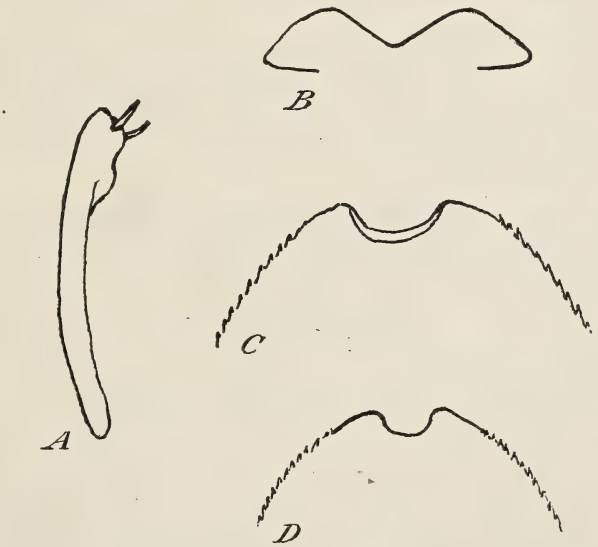

Figure 18.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris purpurata*.

Female.—Rather broadly elongate, moderately depressed above, rather strongly shining, uniformly purplish brown, with a faint cupreous tinge in certain lights; beneath similar in color to above.

Head uniformly purplish red, with two small, smooth callosities on front, and a narrow, longitudinal carina on occiput; front nearly flat; surface coarsely, confluently punctate, sparsely clothed with moderately long, recumbent, white hairs, intervals vaguely granulose; clypeus broadly, subtriangularly emarginate in front, broadly rounded on each side. Antenna bronzy cupreous, slightly

narrowed toward apex; intermediate segments compact, slightly wider than long; third segment one-fourth longer than fourth.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest near middle; sides arcuately rounded, slightly more obliquely converging posteriorly; posterior angles broadly rounded; anterior margin strongly sinuate, with a distinct, broadly rounded median lobe; base broadly, arcuately emarginate on each side, median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, without distinct callosities or depressions; surface sparsely, finely, irregularly punctate, more or less transversely rugose, sparsely clothed at sides with short, white hairs, intervals finely granulose.

Elytra at base slightly wider than pronotum at middle; sides slightly, obliquely diverging from humeral angles to apical third, then arcuately converging to tips, which are separately, broadly rounded; lateral margins not distinctly serrate posteriorly; basal depressions broad and deep; humeral depressions vaguely indicated; surface rather uneven, finely, sparsely, irregularly punctate, sparsely clothed with short, erect, inconspicuous hairs. Each elytron with a short longitudinal costa extending along sutural margin on apical half, the costa sinuate near apex, and three other vaguely indicated costae, and with three small, irregular, coppery-yellow foveae.

Abdomen beneath sparsely, finely punctate, sparsely clothed with short, recumbent, white hairs, with smooth lateral callosities, the intervals vaguely granulose; last visible sternite narrowly emarginate at apex, without a distinct submarginal ridge, lateral margins strongly serrate; eighth tergite sparsely, coarsely punctate, broadly, arcuately emarginate at apex. Prosternum coarsely, sparsely punctate, sparsely clothed with moderately long, recumbent, white hairs; anterior margin with a broad, short, median lobe. Anterior femur with a broad, obtusely triangular tooth, which is strongly dentate on outer margin. Anterior tibia slightly arcuate, unarmed at apex; middle and posterior tibiae straight.

Length 8.75 mm., width 3.5 mm.

Male.—Differing from the female in having the antenna bright green, the head bright green, becoming cupreous on occiput, more finely and densely punctate, with a very broad, obscure chevron on vertex, and the intervals subopaque and densely granulose, the last visible sternite broadly, arcuately emarginate at apex, and the anterior tibia armed with a rounded dilation near apex. Genitalia not examined.

Length 6.5 mm., width 2.6 mm.

Redescribed from the female lectotype and male paratype, No. 3293, in the Academy of Natural Sciences of Philadelphia.

Type locality.—Nebraska, no definite locality.

DISTRIBUTION

From material examined:

CALIFORNIA: Lundy, 7,000 to 8,000 feet, July 8–10 (H. F. Wickham).
NEBRASKA: No definite locality. Type series (John Pearsall).

Host.—Unknown.

No variation worthy of mention was observed in the few specimens examined. This form is rare in collections. Crotch (1873) considered it a color variety of *aeneola* and Horn (1880) placed it as a synonym of that species. It is closely allied to *aeneola* but differs from that species in having the lateral margins of the last visible abdominal sternite distinctly serrate, the elytra ornamented with distinct golden-yellow or cupreous foveae, and the last visible abdominal sternite of the female more deeply, narrowly emarginate at the apex. It seems advisable to retain *purpurata* as a valid species, at least until its habits are known and more material is available for study.

(19) Chrysobothris aeneola LeConte

(Fig. 19; fig. 113, *D*)

Chrysobothris aeneola LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 239–240; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1423; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90; Horn, 1886, Amer. Ent. Soc. Trans. 13: 109, 113–114, pl. 7, figs. 222–226 (part); Kerremans, 1892, Soc. Ent. de Belg. Mem. 1: 206 (part); Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 118; Wickham, 1902, Iowa Univ. Lab. Nat. Hist. Bul. 5: 268; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 180; Woodworth, 1913, Guide to California Insects, p. 195; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 137 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 609 (part).

Figure 19.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris aeneola*.

Male.—Rather broadly elongate, moderately depressed above, subopaque, greenish to purplish brown; beneath purplish brown, with a faint bronzy-green reflection, and more strongly shining than above.

Head bronzy green, with a smooth longitudinal carina on occiput, the carina slightly bifurcate on vertex; front slightly convex; surface coarsely, densely, deeply punctate posteriorly, confluently ocellate-punctate anteriorly, sparsely clothed with long, recumbent, whitish hairs, intervals densely granulose; clypeus broadly, rather deeply, angularly emarginate in front, slightly rounded on each side. Antenna piceous, with a slight bronzy tinge, vaguely narrowed to apex; intermediate segments compact, transverse, broadly rounded at outer margins; third segment shorter than the following two segments united.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest at basal third; sides slightly, arcuately converging at posterior angles, sinuate and nearly parallel at middle, and strongly, arcuately constricted at posterior angles, which are obtusely rounded; anterior margin strongly sinuate, with a strong, broadly rounded, median lobe; base broadly, arcuately emarginate on each side, the median lobe moderately produced and broadly rounded; disk slightly depressed, with a vague median groove, slightly, broadly, transversely depressed at middle behind anterior margin, and rather distinctly depressed on each side near lateral margin; surface finely, deeply, rather densely, uniformly punctate, intervals densely granulose.

Elytra at base subequal in width of pronotum at middle, not twice as long as wide; sides rather strongly diverging from humeral angles to middle, strongly,

arcuately expanded behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins not distinctly serrate; basal depressions broad and rather deep; humeral depressions oblong and shallow; surface finely, densely, deeply, uniformly punctate, very sparsely clothed toward apex with short, inconspicuous, erect, white hairs, without distinct discal foveae, intervals densely granulose. Each elytron with indistinct longitudinal costae, which are not smooth, but granulose, the first slightly elevated on apical half, the others barely indicated by short lines.

Abdomen beneath coarsely, sparsely, irregularly fossulate-punctate, sparsely clothed with short, recumbent, white hairs, without distinct, smooth, lateral callosities, intervals densely granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, the angle on each side of emargination broadly rounded, without a distinct submarginal ridge, lateral margins not serrate; eighth tergite vaguely emarginate at apex, coarsely, confluently punctate, but not longitudinally carinate. Prosternum coarsely, densely punctate, rather densely clothed with long, semierect, white hairs; anterior margin with a distinct, rather long, median lobe. Anterior femur with a broad triangular tooth, which is not distinctly dentate on outer margin. Anterior tibia arcuate, with a short dilation at apex; middle and posterior tibiae straight.

Length 7 mm., width 3 mm.

Redescribed from the male lectotype, No. 2707, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—Differing from the male in having the front of the head uniformly purplish brown and more sparsely pubescent, the last visible sternite more elongate, and shallowly, arcuately emarginate at apex, the eighth tergite broadly rounded at apex, and the surface sparsely punctured, the prosternum more sparsely punctured and less densely pubescent, and the anterior tibia slightly arcuate and unarmed at apex.

Type locality.—Fort Riley, Kans.; lectotype simply labeled with a light-green disk.

DISTRIBUTION

From material examined:

CALIFORNIA: Siskiyou County, July-August (A. Koebele). Mt. Rolston, Aug. 6, 1934 (L. W. Saylor).
KANSAS: Fort Riley. Type series (John Xantus).
NEVADA: No definite locality (Horn collection).
WYOMING: Yellowstone National Park, July 26, August 1 (Hubbard and Schwarz).

Also recorded in the literature from:

COLORADO: Big Blue Canyon (Wickham 1902).
NEVADA: Verdi (Chamberlin 1926).
NEW MEXICO (Fall and Cockerell 1907).

Horn (1886) records it from Nebraska, Arizona, and Texas, but the Nebraska record refers to *purpurata* Bland, and the specimen from Arizona under this name in the Horn collection belongs to another species. No specimens from Texas have been examined by the writer.

Hosts.—The larval habits are unknown, but L. W. Saylor collected the adults at Mt. Rolston flying to and digging into the base of sulphur plants (*Eriogonum* sp.).

The color is rather uniform, in the specimens examined, but frequently the pronotum is slightly sulcate at the middle and the smooth chevron on the front of the head is absent. In the specimens from Mt. Rolston the dorsal surface of the body is more shining, with the pubescence on the elytra slightly longer, the elytral costae more distinct, and the dilation on the anterior tibia of the male not so

distinctly emarginate at the apex. The length is from 6.5 to 8 mm.

Horn (1886) says that the prosternum is not lobed in this species, but in all the specimens, including the types of *aeneola* and *purpurata*, the prosternum is distinctly lobed in front. Chamberlin (1926) gives the type locality as Nebraska, which is incorrect, as LeConte described the species from a male and female collected at Fort Riley, Kans., by John Xantus. Nebraska is the type locality for *purpurata* Bland.

(20) Chrysobothris humilis Horn

(Fig. 20)

Chrysobothris humilis Horn, 1886, Amer. Ent. Soc. Trans. 13: 99, 102–103, pl. 6, figs. 169–172; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 214; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 158; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 636.

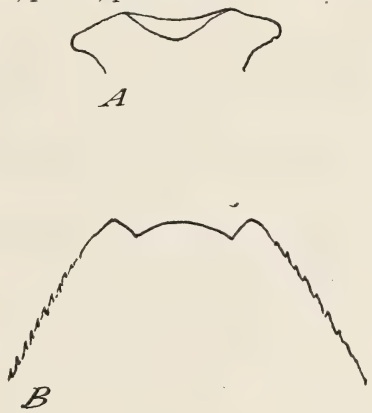

Figure 20.—Clypeus (*A*) and last visible abdominal sternite of female (*B*) of *Chrysobothris humilis*.

Female.—Narrowly elongate, subcylindrical, slightly depressed above, subopaque, uniformly bluish green; beneath bluish or purplish black, the legs more or less cupreous.

Head bluish green, with a vague longitudinal carina on occiput; front nearly flat; surface densely, coarsely, deeply punctate, more confluently toward clypeus, sparsely clothed with moderately long, semierect, whitish hairs, intervals smooth; clypeus smooth, broadly, shallowly, arcuately emarginate in front, obtusely rounded on each side. Antenna uniformly piceous, robust, short, extending to middle of pronotum, slightly narrowed to apex; intermediate segments wider than long, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum twice as wide as long, slightly wider at base than at apex, widest at middle; sides strongly arcuately rounded; anterior margin feebly sinuate, with a broad, slightly rounded, median lobe; base broadly, arcuately emarginate on each side, median lobe slightly, broadly rounded; disk uniformly convex, without depressions or callosities; surface coarsely, deeply, uniformly, confluently punctate, with a few very short, inconspicuous, recumbent hairs.

Elytra at base subequal in width to pronotum at middle, twice as long as wide, not extending to tip of abdomen; sides nearly parallel anteriorly, slightly, arcuately expanded behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins vaguely, coarsely serrate; basal depressions broad and deep; humeral depressions scarcely indicated; surface slightly uneven, without foveae or costae, finely, deeply, uniformly, confluently punctate, with a few short, inconspicuous, recumbent hairs.

Abdomen beneath strongly convex, rather densely, coarsely punctate, densely

clothed with long, recumbent, whitish pubescence, except along anterior margins of sternites, where the surface is smooth and glabrous, without lateral callosities, the intervals vaguely granulose; last visible sternite broadly, transversely sinuate at apex, without a distinct submarginal ridge, lateral margins strongly serrate; eighth tergite broadly rounded at apex, densely, coarsely punctate, but not longitudinally carinate. Prosternum densely, coarsely punctate, sparsely clothed with moderately long, semierect, white hairs; anterior margin strongly deflexed, with a distinct, broad; long, median lobe. Anterior femur without a tooth. Anterior tibia sinuate, unarmed at apex; middle and posterior tibiae straight.

Length 5.75 mm., width 2 mm.

Male.—Unknown.

Redescribed from the female lectotype, No. 3443, in the Academy of Natural Sciences of Philadelphia.

Type locality.—Arizona, no definite locality.

DISTRIBUTION

From material examined:

ARIZONA: No definite locality. Type (Horn collection). Catalina Springs, April 21 (Hubbard and Schwarz).

Host.—The larval habits are unknown, but Hubbard and Schwarz collected a specimen at Catalina Springs on either *Acacia* sp. or *Mimosa* sp.

No variation was observed in the three females examined except in size and color, the length ranging from 5.75 to 6.5 mm. and the color from bright green to bluish green.

(21) CHRYSOBOTHRIS CUPREOHUMERALIS VAN DYKE

(Fig. 21; fig. 113, *E*)

Chrysobothris cupreohumeralis Van Dyke, 1934, Ent. News 45: 65–66.

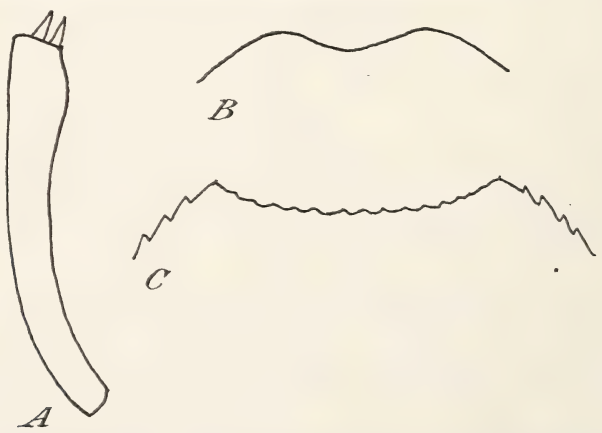

FIGURE 21.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) of *Chrysobothris cupreohumeralis*.

Male.—Broadly elongate, moderately convex above, subopaque, violaceous black, each elytron ornamented with a large reddish-cupreous spot extending along lateral margin from base to middle of elytron; beneath blackish, middle and posterior femora bright bronzy cupreous on outer surfaces.

Head purplish brown, with a distinct cupreous and bronzy tinge in different lights, without smooth callosities or longitudinal carina; front nearly flat; surface coarsely, shallowly, confluently punctate, densely clothed with long, recumbent, whitish hairs, the intervals densely granulose; clypeus broadly, shallowly, arcuately emarginate in front, obliquely truncate on each side. Antenna purplish brown, gradually narrowed to apex; intermediate segments compact, slightly wider than long, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest behind middle; sides arcuately rounded; anterior margin strongly sinuate, with a distinct, broadly rounded, median lobe; base arcuately emarginate on each side, median lobe slightly produced, and broadly rounded; disk rather strongly, uniformly convex, without depressions or callosities; surface coarsely, densely, uniformly punctate, sparsely clothed with short, recumbent, white hairs, the intervals finely, densely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to the tips, which are separately broadly rounded; lateral margins finely serrate; basal depressions broad and moderately deep; humeral depressions broad and shallow; disk moderately convex, without discal foveae, but the inner costa on each elytron vaguely indicated posteriorly; surface finely, densely punctate posteriorly, cribrate basally, clothed with a few short, erect, white hairs.

Abdomen beneath finely, densely punctate, densely clothed with moderately long, recumbent, white hairs, which nearly conceal the surface, smooth along anterior margins of sternites, without smooth lateral callosities, intervals densely, finely granulose; last visible sternite broadly, very shallowly, arcuately emarginate at apex, without a submarginal ridge, lateral margins coarsely serrate; eighth tergite subtruncate at apex, coarsely, densely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, rather densely clothed with long, semierect, whitish hairs; anterior margin with a broad, moderately long, median lobe. Anterior femur without a tooth. Anterior tibia arcuate, expanded toward apex, and armed with a slightly rounded, elongate dilation; middle and posterior tibiae straight.

Length 6.5 mm., width 2.5 mm.

Redescribed from a male specimen from Arizona, in the United States National Museum.

Female.—Not examined.

Type locality.—El Paso, Tex.; type in the California Academy of Sciences.

DISTRIBUTION

From material examined:

ARIZONA: Catalina Springs, March 21, and May 3–5; Santa Rita Mountains, June 3 (Hubbard and Schwarz).

Also recorded in the literature from:

TEXAS: El Paso, April 27, 1927, type (J. O. Martin).

Hosts.—The larval habits are unknown, but the adults have been collected on *Jatropha multifida* Linnaeus at Catalina Springs, Ariz., by Hubbard and Schwarz.

In the few specimens examined no variations worthy of note have been observed except in size, the length ranging from 5.5 to 6.5 mm. The redescription was made from a specimen which was carefully compared with the unique female holotype by E. Gorton Linsley, who writes that the holotype differs slightly in color from the specimen sent, and in having the head aeneous in front with the sides and vertex slightly greenish, and the pronotum a very dark bluish black.

(22) CHRYSOBOTHRIS PROSOPIDIS, new species

(Fig. 22; fig. 113, *F*)

Chrysobothris debilis Horn, 1886, Amer. Ent. Soc. Trans. 13: 72, 75 (part); Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, pp. 47–48 (part); Burke, 1918, Jour. Econ. Ent. 11: 210 (part); Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 145–146 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 618 (part).

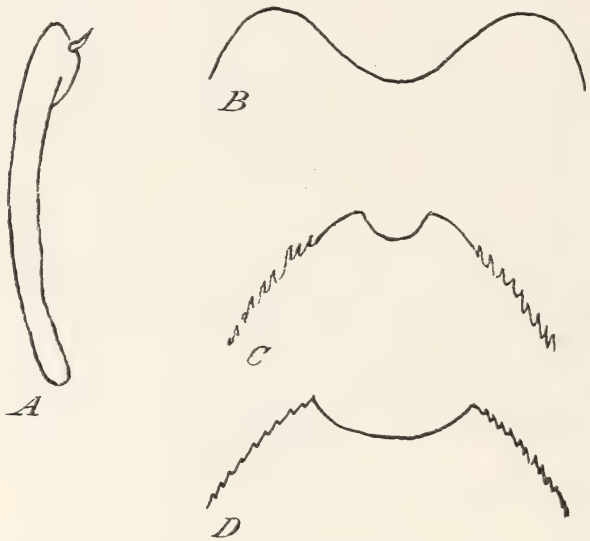

FIGURE 22.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris prosopidis*.

Male.—Moderately elongate, rather strongly convex above, moderately shining, reddish brown, with a faint bronzy tinge, the costae on the elytra bluish black; beneath purplish brown, greenish black along posterior margins of sternites, and more strongly shining than above.

Head reddish cupreous, with two small, smooth callosities on front, and a narrow, longitudinal carina on occiput; front feebly convex; surface rather densely, coarsely, shallowly punctate, sparsely clothed with long, recumbent, whitish hairs, intervals finely, densely granulose; clypeus deeply, semicircularly emarginate in front, arcuately rounded on each side. Antenna uniformly brownish cupreous, feebly narrowed to apex; intermediate segments compact, slightly wider than long, broadly rounded at outer margins; third segment as long as the following two segments united.

Pronotum nearly twice as wide as long, narrower at base than at apex, widest near apex; sides arcuately converging at apical angles, more strongly, arcuately converging from near apical angles to posterior angles; anterior margin strongly sinuate, with a broadly rounded median lobe; base deeply, arcuately emarginate on each side, the median lobe feebly produced, and truncate in front of scutellum; disk moderately convex, without callosities or a median depression; surface densely, rather deeply, uniformly punctate, transversely rugose and more finely punctate at sides, intervals finely, densely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide, widest behind middle; sides feebly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and rather deep; humeral depressions broad and shallow; surface glabrous, densely, finely, uniformly punctate between costae, more or less rugose toward base, intervals densely, finely granulose. Each elytron with four more or less distinct, smooth, longitudinal costae; first straight, extending from apex to near base; second and

third irregular, interrupted by foveae, and not extending to base or apex; fourth feebly indicated, following outline of lateral margin; three densely punctured foveae, first in front of middle interrupting second costa, second and third at apical third interrupting second and third costae.

Abdomen beneath coarsely, rather densely punctate, smooth along anterior and posterior margins of sternites, rather densely clothed at sides with long, recumbent, whitish hairs, with more or less distinct lateral callosities, intervals densely, finely granulose; basal sternite longitudinally concave at middle; last visible sternite deeply, semicircularly emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite densely granulose, sparsely, coarsely punctate, arcuately emarginate at apex, but not longitudinally carinate. Prosternum flat, coarsely, confluently punctate, more or less rugose, rather densely clothed with long, recumbent, white hairs, with a distinct, long, median lobe in front. Anterior femur with a large triangular tooth, which is coarsely dentate on outer margin. Anterior tibia arcuate, with a small rounded dilation at apex; middle and posterior tibiae straight.

Length 7.5 mm., width 3 mm.

Female.—Differing from the male in having the basal sternite of the abdomen convex at middle, the last visible sternite broadly, shallowly emarginate or transversely sinuate at apex, the eighth tergite broadly rounded at apex, longitudinally carinate, and broadly depressed on each side of carina, and the anterior tibia unarmed at apex.

Type locality.—Sabino Canyon, Ariz.

Type material.—Type, allotype, and paratypes in the United States National Museum, No. 55293. Paratypes in the collection of J. N. Knull.

Described from 37 specimens (one male type), as follows:

ARIZONA: No definite locality (H. K. Morrison). Sabino Canyon, April to September, reared (G. Hofer). Santa Catalina Mountains, June to August, 1914, reared; Redington, August 26, 1915, reared (M. Chrisman). Florence, June 24–28, 1903 (C. R. Biedermann). Hot Springs, June 23–28; Santa Rita Mountains, June 18 (Hubbard and Schwarz). Tucson, August 8, 1916; May 12, 1913 (T. E. Snyder, H. F. Wickham). St. Bernardino Ranch, Cochise County, 3,750 feet elevation (E. G. Smyth). Palmerlee, Cochise County (C. Schaeffer). Yuma, June 11, 1937; Wickenburg, June 16, 1937 (D. J. and J. N. Knull). Globe, May 12, 1934; Gila Bend, March 25, 1935 (F. H. Parker).

TEXAS: Esperanza Ranch, Brownsville, June 28 (C. Schaeffer). Agua Negra, May 21, 1895. New Braunfels, May 1902 (M. Mittendorf). Brownsville (J. C. Bridwell). Van Horn, May 23, 1932 (E. G. Linsley).

Hosts.—The adults have been collected and reared from mesquite (*Prosopis juliflora* (Swartz) De Candolle) collected at different localities in Arizona by Hofer, Chrisman, and Hubbard and Schwarz, and the adults have been collected on palo verde (*Cercidium torreyanum* (Watson) Sargent), at Tucson by T. E. Snyder, and in the Santa Catalina Mountains by M. Chrisman, and this plant may also be host for the species.

This species is mixed in all collections with *debilis*, which it resembles very closely, but the longitudinal costae on the elytra, especially the second and third, are usually more distinctly elevated in *prosopidis*. The males may be readily separated by the quite distinct genitalia, but the females will be more difficult to distinguish.

In some specimens the head is slightly greenish behind the clypeus, the surface more densely pubescent, and the carina on the occiput usually more or less bifurcate anteriorly. The sides of the pronotum are either arcuately or sinuately convergent posteriorly and the surface of the pronotum more or less irregularly punctured in some examples. Length 6.5–10 mm.

(23) Chrysobothris debilis LeConte

(Fig. 23)

Chrysobothris debilis LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 236; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1424; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90; Horn, 1886, Amer. Ent. Soc. Trans. 13: 72, 75, 119, pl. 2, figs. 15–19 (part); Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, pp. 47–48 (part); Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 210; Cockerell, 1898, N. Mex. Agr. Expt. Sta. Bul. 28: 152; Griffith, 1900, Ent. News 11: 568; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 117; Cockerell, 1902, Psyche 9: 378; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 179; Blatchley, 1910, Coleoptera of Indiana, pp. 788, 789; Woodworth, 1913, Guide to California Insects, p. 196; Van Dyke, 1918, Ent. News 29: 58; Burke, 1918, Jour. Econ. Ent. 11: 210 (= *lateralis* or *prosopidis*); Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 145–146 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 618 (part). Some of these records may refer to *lateralis* or *prosopidis*.

Chrysobothris disjuncta LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 236–237; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1425; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90.

Figure 23.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris debilis*.

Male.—Moderately elongate, rather strongly convex above, rather strongly shining, reddish brown; elytra with the costae more or less greenish or bluish black, and the foveae distinctly cupreous; beneath purplish brown, with a faint greenish reflection, and more strongly shining than above.

Head reddish brown, more or less greenish on clypeus, with two small, vague, smooth callosities on front, and a narrow longitudinal carina on occiput, the carina slightly bifurcate on vertex; front slightly convex; surface rather densely, coarsely, shallowly punctate, feebly, transversely rugose behind clypeus, sparsely clothed with moderately long, recumbent, whitish hairs, intervals densely granulose; clypeus deeply, arcuately emarginate in front, strongly rounded on each side. Antenna uniformly cupreous, nearly equal in width to apex; intermediate segments compact, slightly wider than long, broadly rounded at outer margins; third segment slightly shorter than the following two segments united.

Pronotum nearly twice as wide as long, narrower at base than at apex, widest near apex; sides sinuate and strongly, arcuately converging from near apical angles to posterior angles, more strongly on posterior third; anterior margin sinuate, with a broad, obscurely rounded, median lobe; base slightly emarginate on each side, the median lobe slightly produced, and truncate in front of scutellum; disk moderately convex, without a median depression or smooth callosities; surface sparsely, finely, shallowly punctate, finely, transversely rugose, especially at sides, intervals densely granulose.

Elytra slightly wider than pronotum, twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and moderately deep; humeral depressions broad and shallow; surface glabrous, densely, finely punctate, more densely and somewhat rugose toward base, intervals indistinctly granulose. Each elytron with four more or less distinct longitudinal costae, the first elevated on apical half, the others indicated by more or less distinct lines, which are interrupted by the foveae, and with three densely punctured foveae; first just in front of middle, interrupting the second costa; second at apical third, interrupting the third costa; third slightly behind the second fovea, interrupting the second costa.

Abdomen beneath rather densely, coarsely punctate, smooth along anterior and posterior margins of sternites, densely clothed at sides with long, semierect, white hairs, with vaguely indicated lateral callosities, intervals densely granulose; basal sternite longitudinally depressed at middle; last visible sternite broadly, deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite angularly emarginate at apex, coarsely punctate, densely granulose, but without a longitudinal carina. Prosternum flat, coarsely, confluently punctate, transversely rugose, densely granulose, densely clothed with long, recumbent, white hairs, with a distinct, broad, median lobe in front. Anterior femur with a broad, rather acute, triangular tooth, which is coarsely dentate on outer margin. Anterior tibia strongly arcuate, with a short, indistinct dilation at apex; middle and posterior tibiae straight. Genitalia similar to those of *lateralis*.

Length 7.5 mm., width 2.7 mm.

Redescribed from the male type, No. 2686, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—Differing from the male in having the antenna uniformly piceous, the basal sternite of the abdomen convex at middle, the last visible sternite broadly, shallowly emarginate at apex (nearly truncate), the eighth tergite broadly rounded at apex, longitudinally carinate, and broadly depressed on each side of the carina, and the anterior tibia unarmed at apex.

Type locality.—Of *debilis*, Ohio; type, No. 2686, simply labeled with a yellow disk. Of *disjuncta*, Arizona; type, No. 2687, simply labeled with a silver disk. Both types in the Museum of Comparative Zoology.

DISTRIBUTION

From material examined:

ARIZONA: No definite locality, type of *disjuncta*, labeled with a silver disk, which indicates the valley of the Gila.

CALIFORNIA: San Diego County (D. W. Coquillett). Indio, April 4, 1925 (R. E. Campbell). Panamint Valley, April 1891; Death Valley, April 1891 (A. Koebele).

NEVADA: Overton, May 12, 1930 (E. W. Davis).

Chamberlin (1926) records it from various localities in Arizona, California, Colorado, Lower California, New Mexico, Texas, and Utah, but many of these records refer to *lateralis* and *prosopidis*.

Hosts.—The adults have been collected on mesquite (*Prosopis juliflora* (Swartz) De Candolle) in Death Valley, Calif., by A. Koebele, and on honey mesquite (*Prosopis juliflora glandulosa* (Torrey) Cook) at Overton, Nev., by E. W. Davis. Burke (1918) re-

cords the species as mining the bark and wood of dying and dead limbs and trunks of emory oak (*Quercus emoryi* Torrey), palo blanco (*Celtis reticulata* Torrey), catclaw (*Acacia greggii* Gray), mesquite. (*Prosopis juliflora* (Swartz) De Candolle), and palo verde (*Cercidium torreyanum* (Watson) Sargent) collected in Arizona, but most of these records refer to *lateralis* or *prosopidis* and should be verified. Fall (1901) and Van Dyke (1918) record it as breeding in mesquite in California.

The sculpture on the dorsal surface of the body is rather uniform, but the color is slightly variable; some specimens are more cupreous than others and the foveae on the elytra vary in color from yellowish green to reddish cupreous. In a few specimens examined the sides of the pronotum are nearly parallel at the middle and strongly convergent posteriorly. The abdominal sternites are with or without vague lateral callosities. The length is from 6.5 to 8.5 mm.

LeConte describes this species from the "Western States: one male from Ohio, Dr. Schaum." There may be some mistake in the labeling of this specimen, as no specimens have been seen from the East, and all the specimens examined which agree with the type are from the Western States.

Chrysobothris disjuncta is more uniformly reddish cupreous in color and was placed by Horn (1886) as a synonym of *debilis*.

(24) Chrysobothris edwardsii Horn

(Fig. 24; fig. 114, *A*)

Chrysobothris edwardsii Horn, 1886, Amer. Ent. Soc. Trans. 13: 71, 74, pl. 2, figs. 11–14; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 212 (*edwarsi*, typographical error); Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 328; Burke, 1918, Jour. Econ. Ent. 11: 210; Schaeffer, 1905, Brooklyn Inst. Arts and Sci., Mus., Sci. Bul. 1: 129; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 149; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 622–623.

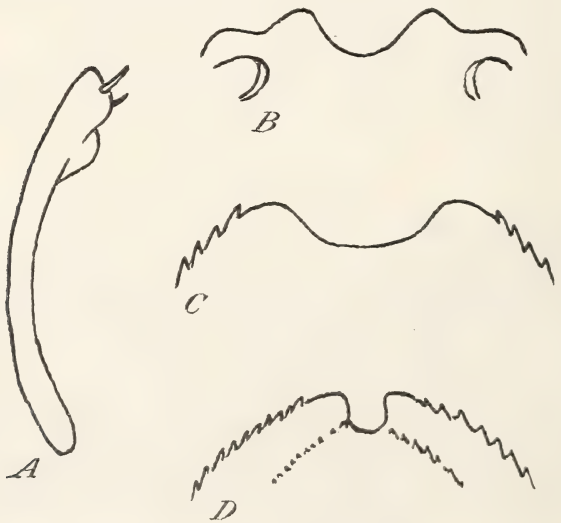

Figure 24.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris edwardsii*

Female.—Broadly elongate, moderately convex above, rather strongly shining, piceous, with faint bronzy and purplish reflections; beneath brownish cupreous, with a vague greenish tinge, and more strongly shining than above.

Head bronzy brown, with two slightly elevated, smooth callosities on front, and a narrow, smooth, longitudinal carina on occiput, the carina bifurcate on vertex; front slightly convex; surface coarsely, confluently, shallowly punctate, densely clothed with long, recumbent, white hairs, intervals finely granulose; clypeus broadly, semicircularly emarginate in front, with a large triangular tooth on each side of emargination, then truncate externally. Antenna piceous, gradually narrowed to apex; intermediate segments not compact, about as wide as long, broadly subtruncate at outer margins; third segment nearly as long as following two segments united.

Pronotum twice as wide as long, narrower at apex than at base, widest along middle; sides strongly sinuate at middle, obliquely converging toward apical angles, arcuately converging toward posterior angles; anterior margin slightly sinuate, with an indistinct, broadly rounded, median lobe: base arcuately emarginate on each side, median lobe strongly produced and broadly rounded; disk even, regularly convex, without depressions or callosities; surface sparsely, rather coarsely, deeply punctate at middle, transversely rugose on each side.

Elytra slightly wider than pronotum, nearly twice as long as wide, widest behind middle; sides vaguely diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions deep; humeral depressions broad and shallow; surface glabrous, slightly uneven, rather densely, uniformly punctate, intervals densely granulose. Each elytron with four rather distinct longitudinal costae; first straight, sharply elevated from apex to basal third; second sinuate, extending from base to near apex, slightly elevated basally, strongly elevated and arcuate behind middle; third short, vaguely elevated; fourth following outline of lateral margin, more or less distinct on apical half, obsolete anteriorly; with two indistinct, discal foveae, one at apical fourth between first and second costae, the other more anterior and interrupting third costa.

Abdomen beneath coarsely, irregularly punctate, sparsely at middle, more densely punctate and transversely rugose at sides, rather densely clothed with moderately long, recumbent, white hairs, with distinct, smooth, elevated, lateral callosities, intervals densely granulose; last visible sternite arcuately rounded, with a small median notch at apex, and with a strongly elevated, serrate, submarginal ridge, lateral margins strongly serrate; eighth tergite broadly subtruncate at apex, coarsely, deeply, confluently punctate, but not longitudinally carinate. Prosternum smooth at middle, coarsely, densely punctate at sides, rather densely clothed with long, semierect, white hairs; anterior margin broadly, arcuately rounded, but without a distinct median lobe. Anterior femur with a large, acutely triangular tooth, which is dentate on outer margin. Anterior tibia arcuate, unarmed at apex; middle and posterior tibiae straight.

Length 12 mm., width 5.5 mm.

Redescribed from the female type, No. 3428, in the Academy of Natural Sciences of Philadelphia.

Male.—Differing from the female in having the front of the head uniformly cupreous, sometimes greenish on clypeus, more finely, densely punctured and more densely pubescent, the antenna uniformly bronzy green, the last visible sternite broadly, deeply, arcuately emarginate at apex, and the surface broadly depressed at middle, the eighth tergite slightly emarginate at apex, and sparsely, coarsely punctured, the prosternum more densely clothed with longer pubescence, the anterior tibia strongly arcuate, and armed with a small, rounded tooth near apex, and the middle tibia slightly arcuate, and indistinctly expanded at apex.

Type locality.—Tucson, Ariz.

DISTRIBUTION

From material examined:

ARIZONA: Tucson, August 24 (H. F. Wickham, Henry Edwards). Brush Carrol, reared (G. Hofer, M. Chrisman). Hot Springs, June 24 (Barber and Schwarz). Florence, July to September, 1903 (C. R. Biedermann).
NEW MEXICO: Alamogordo, May 1902.

Chamberlin (1926) records it from Ft. Grant and Palmerlee, Ariz.; San José del Cabo, Lower California; and El Paso, Tex.

Host.—Adults were reared from larvae mining the bark and wood of dying and dead stems of ocotillo (*Fouquieria splendens* Engelmann) collected in Arizona by G. Hofer.

The color and sculpture of the dorsal surface of the body are rather constant. The sides of the pronotum are either sinuate or arcuately rounded at the middle, and the sides of the elytra are usually parallel from the humeral angles to the apical third, but occasionally specimens are found with the elytra widest behind the middle. In some examples the prosternum is vaguely lobed in front, but none could be considered as having it distinctly lobed. In the females the apex of the last visible abdominal sternite is either narrowly notched or rounded and serrate. The length is from 10.5 to 13 mm.

Horn (1886) states that the prosternum is distinctly lobed in front, but in the type the anterior margin is arcuately rounded in front, although it cannot be considered as having a lobe.

The species resembles *schaefferi*, but it is readily separated from that species by the shape of the clypeus, which has a tooth on each side of the median emargination, whereas in *schaefferi* the sides are arcuately rounded.

(25) Chrysobothris schaefferi Obenberger

(Fig. 25; fig. 114, *B*)

Chrysobothris thoracicus Schaeffer, 1905, Brooklyn Inst. Arts and Sci., Mus., Sci. Bul. 1: 128–129; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 173. (Name preoccupied.)

Chrysobothris schaefferi Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132: 649.

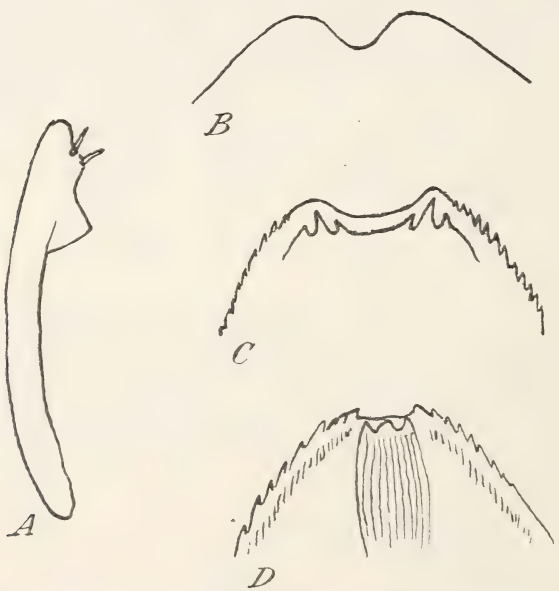

Figure 25.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris schaefferi*.

Female.—Broadly elongate, moderately convex above, rather strongly shining, dark brown, with distinct purplish and greenish reflections in different lights; beneath uniformly purplish red, and more strongly shining than above.

Head uniformly bronzy brown, with two irregular, smooth callosities on front, and a narrow longitudinal carina on occiput, the carina bifurcate anteriorly; front slightly convex; surface coarsely, densely, irregularly punctate, sparsely clothed with long, fine, semierect hairs, intervals finely, densely granulose; clypeus semicircularly emarginate in front, arcuately rounded on each side. Antenna uniformly brownish cupreous, nearly equal in width to apex; intermediate segments slightly wider than long, subtruncate at outer margins; third segment subequal in length to following two segments united.

Pronotum twice as wide as long, narrower at apex than at base, widest at basal third; sides diverging from apical angles to basal third, where they are arcuately rounded, then arcuately converging to posterior angles; anterior margin slightly sinuate, without a distinct median lobe; base broadly, arcuately emarginate on each side, median lobe broadly rounded; disk uniformly convex, without depressions or callosities, but with an indistinct, longitudinal, impressed, median line; surface glabrous, coarsely, rather densely, uniformly punctate at middle, more densely punctate and transversely rugose at sides.

Elytra slightly wider than pronotum, nearly twice as long as wide, widest at apical third; sides slightly diverging from humeral angles to apical third, then obliquely converging to tips, which are conjointly broadly rounded; lateral margins coarsely serrate posteriorly; basal depressions deep; humeral depressions scarcely indicated; surface glabrous, rather densely, uniformly punctate, more densely at sides. Each elytron with four longitudinal costae; first straight, strongly elevated from apex to basal third; second sinuate, extending from apex to base, strongly elevated posteriorly, interrupted by median fovea; third short, joined to fourth at basal fourth, interrupted posteriorly by second fovea; fourth scarcely indicated, following outline of lateral margin; with three vaguely impressed, discal foveae, one at apical fourth between first and second costae, second more anterior and interrupting third costa, and third slightly in front of middle and interrupting second costa.

Abdomen beneath coarsely, irregularly punctate at middle, densely punctate at sides, sparsely clothed toward sides with long, recumbent, whitish hairs, intervals densely, finely granulose; sternites vaguely, longitudinally concave at middle, with smooth, elevated, lateral callosities; last visible sternite longitudinally concave, shallowly emarginate at apex, with an elevated, serrate, submarginal ridge, lateral margins strongly serrate; eighth tergite slightly emarginate at apex, coarsely, sparsely punctate, densely granulose, but not longitudinally carinate. Prosternum sparsely, finely punctate at sides, smooth at middle, sparsely clothed with long, recumbent, whitish hairs, broadly rounded in front, but without a distinct median lobe. Anterior femur with a large triangular tooth, which is strongly dentate on outer margin. Anterior tibia strongly arcuate, unarmed at apex; middle and posterior tibiae straight.

Length 11.5 mm., width 5 mm.

Redescribed from the female lectotype (present designation), No. 42654, in the United States National Museum.

Male.—Differing from the female in having the clypeus bright green, the front of the head more finely, densely, uniformly punctate, and rather densely clothed with long, recumbent, white hairs, the last visible abdominal sternite broadly, shallowly, arcuately emarginate at apex, the eighth tergite more sparsely punctured, and rather deeply, triangularly emarginate at apex, the prosternum more densely pubescent, the middle tibia slightly arcuate and armed with a vague triangular dilation near apex, and the anterior tibia strongly arcuate, with a large triangular tooth near apex.

Type locality.—El Taste, Lower California.

DISTRIBUTION

From material examined:

Lower California: El Taste, type series (G. Beyer). Santa Rosa and San Felipe (G. Beyer, Notman collection).

Host.—Unknown.

Very little variation was observed in the few specimens examined except in size, and that in some of these specimens the median impressed line on the pronotum is absent. No differences were observed

between the specimens in the Notman collection collected by G. Beyer at San Felipe and Santa Rosa and the type series collected by the same collector at El Taste. The length is from 10 to 12.5 mm.

Schaeffer described this species from two females collected by G. Beyer and gave the localities as El Taste and Santa Rosa, Lower California, but the two females received from the Brooklyn Museum are labeled types and are both from El Taste. Schaeffer called the species *thoracicus*, but this name is preoccupied by a species from the West Indies described by Fabricius (1798), and Obenberger (1934) has proposed the name *schaefferi* for *thoracicus* Schaeffer (not Fabricius).

(26) Chrysobothris basalis LeConte

(Fig. 26; fig. 114, *C*)

Chrysobothris basalis LeConte, 1858, Acad. Nat. Sci. Phila. Proc. [10]: 68; 1858, Acad. Nat. Sci. Phila. Jour. (ser. 2) 4: 34; 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 230–231; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1424; LeConte, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 332.

Chrysobothris atabalipa LeConte (not Castelnau and Gory), 1857, Acad. Nat. Sci. Phila. Proc. [9]: 8 (misidentification); 1873, Acad. Nat. Sci. Phila. Proc. [25]: 332; Horn, 1886, Amer. Ent. Soc. Trans. 13: 71, 72–73, 119, pl. 2, figs. 1–5 (part); Cockerell, 1898, N. Mex. Agr. Expt. Sta. Bul. 28: 152; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 179; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 138 (part); Obenberger, 1934, *in* Junk (pub.), Cat. Coleopt., pt. 132, p. 610 (part).

Chrysobothris multistigmosa Kerremans (not Mannerheim), 1892, Soc. Ent. de Belg. Mém. 1: 217 (part); Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, pp. 46–47 (part); Chamberlin, 1926, Cat. Buprestidae North Amer., p. 164 (part); Obenberger, 1934, *in* Junk (pub.), Cat. Coleopt., pt. 132, p. 642 (part).

Figure 26.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris basalis*.

Female.—Elongate, slightly convex above, rather strongly shining, bronzy brown, with the punctures cupreous, and each elytron with four greenish-yellow foveae; beneath purplish brown, bronzy green in part, and more strongly shining than above.

Head bronzy green, becoming brownish cupreous on occiput, with a vague angulated callosity on front and a narrow longitudinal carina on occiput; front nearly flat; surface coarsely, confluently punctate, sparsely clothed with rather long, erect, inconspicuous hairs; clypeus deeply, angularly emarginate in front, broadly rounded on each side. Antenna uniformly brownish cupreous, distinctly narrowed to apex; intermediate segments about as wide as long, not compact, broadly rounded at outer margins; third segment as long as following two segments united, with sides of segment parallel.

Pronotum two-fifths wider than long, slightly wider at base than at apex, widest at apical fourth; sides obliquely converging on apical fourth, sinuate and obliquely converging from apical fourth to posterior angles; anterior margin arcuately emarginate, without a distinct median lobe; base arcuately emarginate on each side, median lobe strongly produced, and truncate in front of scutellum; disk rather strongly convex, without callosities or depressions; surface glabrous, sparsely, finely, irregularly punctate at middle, with a few irregular, smooth spaces, more densely punctate toward sides.

Elytra slightly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate posteriorly; basal depressions greenish yellow, round, and deep; humeral depressions broad and very shallow; surface glabrous, rather densely, finely punctate. Each elytron with four more or less distinct longitudinal costae; first straight, strongly elevated posteriorly, extending from apex to base; second straight and strongly elevated on apical half, arcuate and vaguely indicated on basal half; third and fourth obsolete; with three impressed greenish-yellow foveae, one in front of middle, interrupting second costa, second behind middle, interrupting third costa, and third near apical third between first and second costae.

Abdomen beneath coarsely, sparsely, irregularly punctate at middle, densely punctate and densely clothed with rather long, erect hairs at sides, smooth along anterior and posterior margins of sternites, and with smooth lateral callosities; basal sternites longitudinally depressed; last visible sternite shallowly, arcuately emarginate and coarsely dentate at apex, strongly, longitudinally carinate at middle, depressed between tip of carina and apex, with lateral callosities strongly, acutely elevated, and lateral margins strongly serrate; eighth tergite coarsely, densely punctate, apex slightly deflexed and narrowly emarginate, longitudinally carinate and depressed on each side of carina. Prosternum smooth at middle, coarsely punctate at sides, sparsely clothed with long, erect, inconspicuous hairs; anterior margin feebly, narrowly lobed. Anterior femur with a short, obtuse tooth, which is coarsely dentate on outer margin; posterior femur coarsely dentate on outer margin. Anterior and middle tibiae arcuate; posterior tibia straight.

Length 17 mm., width 6.5 mm.

Redescribed from the female lectotype, No. 2689, in the Museum of Comparative Zoology, Cambridge, Mass.

Male.—Differing from the female in having the antenna bronzy green, more or less reddish cupreous, with the third segment subtriangular, the front of the head without smooth callosities, the last visible sternite deeply, arcuately emarginate at apex, but not longitudinally carinate, the eighth tergite sparsely punctured, slightly notched at apex, and very densely clothed at apex with erect, white hairs, and anterior and middle tibiae armed with a number of small teeth on their inner margins.

Type locality.—Laredo to Ringgold Barracks, Tex. Type simply labeled with a red disk.

DISTRIBUTION

From material examined:

ARIZONA: Tucson, August 12–14 (H. F. Wickham).
TEXAS: Laredo to Ringgold Barracks,[3] type (Schott). Laredo, October 10, 1924. Brownsville (H. F. Wickham and C. H. T. Townsend); March 23, 1908 (Jones and Pratt); August 15, 1922 (T. C. Barber); May 1 (C. Schaeffer); June 5, 1904 (H. S. Barber).
MEXICO: Fordale (M. M. Salozano).

Chamberlin (1926) records the species from Yuma, Oracle, and Hot Springs, Ariz.; Placer County, Death Valley, Calif.; and Mesilla Valley, N. Mex., under *atabalipa* Castelnau and Gory.

Host.—Unknown.

The color and sculpture on the dorsal surface of the body are constant, but the foveae on the elytra vary in color from greenish yellow to reddish yellow. The length is from 15 to 20 mm.

LeConte (1857) applied the name *atabalipa* Castelnau and Gory to the specimens found abundantly in Texas, but in 1858 described them as a new species under the name *basalis*. Saunders (1871) placed *basalis* as a synonym of *atabalipa* and LeConte (1873) states: "*Chrysobothris basalis* Lec. is *atabalipa* C. & G. and *Colobogaster multistigmosa* Mannerheim."

Waterhouse (1887) has *basalis* and *atabalipa* confused under *multistigmosa*, in the treatment of which he says:

> The male appears to be dimorphic: numerous examples from various parts of Mexico and one from Salvador have the antenna broad, compressed, and coppery, with the third joint at its apex as broad as its length; other specimens from the same localities have the antennae comparatively narrow, with the third joint elongate, scarcely widened at its apex. I have not seen an example of the form with the broad antennae from the United States.

Superficially the specimens of these species resemble one another very closely but the male genitalia and third antennal segment are quite distinct in the different forms and certainly represent valid species. Waterhouse probably did not examine any males of *basalis* from the United States.

The type of *basalis* has been studied, and it agrees with all the specimens examined from the United States and northern Mexico, and is distinct from the other two species with which it has been confused.

(27) CHRYSOBOTHRIS OCTOCOLA LeConte

(Fig. 27; fig. 114 *D*)

Chrysobothris octocola LeConte, 1858, Acad. Nat. Sci. Phila. Proc. [10]: 67; 1858. Acad. Nat. Sci. Phila. Jour. (ser. 2) 4: 34; 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 230; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1426; Horn, 1886, Amer. Ent. Soc. Trans. 13: 71, 73–74, pl. 2, figs. 6–10; Waterhouse, 1887, Biol. Cent-Amer., Coleopt., v. 3, pt. 1, p. 46; Packard, 1890, U. S. Ent. Comn. Rpt. 5: 670; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 217; Wickham, 1898, Iowa Univ. Lab. Nat. Hist. Bul. 4 (3): 305; 1898, Ent. News 9: 40, 235; Griffith, 1900, Ent. News 11: 568; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 117; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 154; Kerremans, 1913, Paris Mus. d'Hist. Nat. Bul. 19: 578; Woodworth, 1913, Guide to California Insects, pp. 194, 196; Van Dyke, 1918, Ent. News 29: 58; Burke, 1918,

[3] The Ringgold Barracks were in Texas along the Mexican border midway between Laredo and Brownsville.

Jour. Econ. Ent. 11: 210; Craighead and Hofer, 1921, U. S. Dept. Agr. Farmers' Bul. 1197: 9, figs. 8, 10, 15; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 165; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 644.

Chrysobothris octopunctata Kunze, 1904, Ent. News 15: 242 (misidentification); Wickham, 1904, Ent. News 15: 307; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 644.

FIGURE 27.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris octocola*.

Female.—Moderately elongate, rather strongly depressed above, moderately shining, olivaceous brown, with faint purplish and greenish reflections in different lights, and each elytron with four yellowish-cupreous foveae; beneath brownish cupreous, more strongly shining than above, the tarsi, margins of sternites, and lateral callosities on sternites greenish or bluish black.

Head bronzy brown, green along anterior margin of clypeus, with a transverse, irregular ridge behind clypeus, a broadly angulated chevron on front, and a narrow, smooth, longitudinal carina on occiput; front slightly convex; surface coarsely, deeply, confluently punctate, sparsely clothed with long, semierect, white hairs; clypeus broadly, rather deeply, arcuately emarginate in front, broadly rounded on each side. Antenna uniformly bronzy brown, gradually narrowed to apex; intermediate segments as long as wide, broadly rounded at outer margins; third segment subequal in length to following two segments united.

Pronotum nearly twice as wide as long, slightly wider at base than at apex, widest at apical third; sides arcuately converging toward apex and base; anterior margin broadly, arcuately emarginate, with an indistinct, broadly rounded, median lobe; base vaguely, arcuately emarginate on each side, the median lobe rather strongly produced and broadly rounded; disk uniformly convex, without depressions or callosities; surface coarsely, densely, uniformly punctate at middle, confluently, rugosely punctate at sides.

Elytra at base slightly wider than pronotum at apical third, twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins

coarsely serrate; basal depresssions broad and deep; humeral depressions broad and shallow; surface glabrous, densely, coarsely, uniformly punctate. Each elytron with four longitudinal costae; first distinct, strongly elevated posteriorly, parallel with sutural margin; second and third short, the latter interrupted by third fovea; fourth slightly indicated anteriorly, distinct posteriorly, following outline of lateral margin; with four densely punctured, depressed, yellowish-cupreous foveae; first in basal depression; second in front of middle, interrupting second costa; third at apical third, interrupting third costa; and fourth at apical fourth between first and second costae.

Abdomen beneath coarsely, sparsely fossulate-punctate, except along anterior and posterior margins of sternites, sparsely clothed at sides with recumbent, whitish hairs, with distinct, smooth, elevated, lateral callosities, intervals vaguely granulose; last visible sternite longitudinally carinate, bimarginate at apex, with median tooth obtusely rounded, subapical ridge dentate, and with a serrate submarginal ridge, lateral margins strongly serrate; eighth tergite narrowly, angularly or semicircularly emarginate at apex, strongly, longitudinally carinate at middle, deeply depressed on each side of carina, the surface coarsely, densely punctate. Prosternum coarsely, deeply, rather densely punctate at sides, smooth at middle, sparsely clothed at sides with long, recumbent, whitish hairs, the anterior margin broadly rounded, with a short, broad, median lobe. Anterior femur with a broad, obtusely rounded tooth, which is coarsely dentate on outer margin; posterior femur not dentate on outer margin. Anterior and middle tibiae feebly arcuate, unarmed; posterior tibia straight.

Length 17 mm., width 6.5 mm.

Redescribed from the female type, No. 2688, in the Museum of Comparative Zoology, Cambridge, Mass.

Male.—Differing from the female in having the head bronzy green, more rugosely punctured and more densely pubescent, and with two vague callosities on front, the antenna bronzy green, with the outer tips of the segments yellowish, the prosternum more densely pubescent, the last visible sternite shorter, semicircularly emarginate at apex, but not longitudinally carinate, the eighth tergite slightly emarginate at apex, sparsely, coarsely punctured, but not longitudinally carinate, and the anterior and middle tibiae strongly arcuate, the former armed with about five small teeth on inner margin.

Type locality.—Colorado River near Gila, Ariz. Type simply labeled with a silver disk. The type locality given by Chamberlin (1926) as Texas is incorrect.

DISTRIBUTION

From material examined:

ARIZONA: Many localities.
CALIFORNIA: Los Angeles County (D. W. Coquillett). Yuma (H. F. Wickham). Death Valley and Panamint Valley, April 1891 (A. Koebele). Acme, August 8, 1918; Furnace Creek Ranch, Death Valley, August 16, 1918; Indio, Riverside County, September 17, 1922 (Rehn and Hebard).
LOWER CALIFORNIA: Santa Rosa (G. Beyer).
MEXICO: Puente de Ixtla, July 1900 (C. C. Deam). Reynosa, May 20, 1895.
NEW MEXICO: Alamogordo, May 16, 1902; Silver City, October 21, 1935 (R. T. Kellogg).
TEXAS: Many localities.

Hosts.—Wickham (1898) collected the adults on huisache (*Acacia farneisana* (Linnaeus) Wildenow) at Brownsville, Tex., and the adults have been reared from palo verde (*Cercidium torreyanum* (Watson) Sargent) and mesquite (*Prosopis juliflora* (Swartz) De Candolle).

The sculpture is rather constant, but the color varies from olivaceous brown to a bright reddish cupreous, and the foveae on the elytra from green to yellowish cupreous. The smooth spots on the front of the head are sometimes absent, and the clypeus is either arcuately or angularly emarginate in front. The pronotum is usually widest at

the apical third, but occasionally a specimen is found with the pronotum widest at the middle and the sides regularly rounded. The greatest differences are found in the tips of the last visible abdominal sternite and eighth abdominal tergite of the females. In some examples the apex of the last visible sternite is strongly biemarginate, with the median tooth angularly produced, the subapical ridge strongly dentate and produced into an acute, median tooth, and with the apex of the eighth tergite narrowly, transversely emarginate, with the lateral tooth on each side curved inward, whereas in other specimens the apex of the last visible sternite is biemarginate, with the median tooth obtusely rounded, the subapical ridge dentate, transverse, but not produced at the middle, and the eighth tergite with a small angular or semicircular emargination at the apex. No differences can be found in the males associated with the two forms of females, except that the sides of the genitalia are a little more strongly expanded in some specimens than in others. The length is from 11 to 17 mm.

This species is common wherever mesquite is found. The larvae mine the bark and wood of dying and dead plants, and often cause severe injury wherever mesquite is used for posts and firewood.

(28) Chrysobothris semisculpta LeConte

(Fig. 28; fig. 114, *E*)

Chrysobothris semisculpta LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) **11**: 254–255; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1427; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25] : 90; Horn, 1883, Amer. Ent. Soc. Trans. 10: 287; Blaisdell, 1892, Insect Life 5: 33 (misindentification, probably *mali*); Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 117; Woodworth, 1913, Guide to California Insects, p. 196.

Chrysobothris contigua LeConte, 1859, Amer. Phil. Soc. Trans. 11: 255; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1424; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90; Horn, 1883, Amer. Ent. Soc. Trans. 10: 286; 1886, Amer. Ent. Soc. Trans. 13: 79–81, pl. 2, figs. 35–39; Woodworth, 1913, Guide to California Insects, pp. 194, 196; Chamberlin, 1917, Ent. News 28: 135; 1925, N. Y. Ent. Soc. Jour. (1924) 32: 190 (separate, p. 189); 1926, Cat. Buprestidae North Amer., p. 144; 1929, Pan-Pacific Ent. 5: 110–111, 115, fig. 4; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 616. (New synonymy.)

Chrysobothris purpurifrons Motschulsky, 1859, Soc. Imp. Nat. Moscou Bul. **32**: 183–184; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1427; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 218; Woodworth, 1913, Guide to California Insects, p. 196; Lange, 1937, Pan-Pacific Ent. 13: 173.

Male.—Moderately elongate, rather strongly depressed above, moderately shining, piceous, with a distinct cupreous or aeneous tinge, the pronotum slightly more cupreous; beneath cupreous, with a distinct greenish reflection, and more strongly shining than above.

Head bronzy brown, with a faint cupreous tinge, brilliant green along anterior margin of clypeus, with an obscure longitudinal carina on occiput; front moderately convex; surface coarsely, densely, shallowly punctate, slightly, transversely rugose behind the clypeus, sparsely clothed with long, semierect, whitish hairs, the intervals vaguely granulose; clypeus with a narrow, angular notch at middle, on each side of which is a distinct, acute tooth, and transversely sinuate externally. Antenna uniformly bronzy green, slightly narrowed to apex; intermediate segments wider than long, subtriangular, broadly rounded at outer margins; third segment subequal in length to following two segments united.

Pronotum twice as wide as long, subequal in width at base and apex, widest near apex; sides strongly converging at apex, obliquely converging and slightly

sinuate from near apex to posterior angles; anterior margin vaguely, transversely sinuate, with an indistinct, median lobe; base strongly, arcuately emarginate on each side, the median lobe strongly, broadly rounded; disk uneven, slightly convex, with a vague, longitudinal, median depression; surface coarsely, deeply, irregularly punctate, more densely, rugosely at sides, intervals feebly granulose.

Elytra at base slightly wider than pronotum near apex, twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to the tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, uneven, coarsely, deeply, irregularly punctate, with numerous irregular, smooth spaces. Each elytron with a rather distinct longitudinal costa along sutural margin becoming obsolete basally, the other costae confused and indistinct, and with three large, slightly depressed, inconspicuous foveae, one at middle and two at apical third.

Abdomen beneath sparsely, coarsely, irregularly punctate, sparsely, irregularly clothed with short, semierect, white hairs, each sternite with a smooth, elevated callosity on each side near lateral margin; last visible sternite semicircularly emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite broadly rounded at apex, coarsely, rather densely punctate, densely granulose, but not longitudinally carinate. Prosternum coarsely, confluently punctate, rather densely clothed with long, erect, white hairs, with a distinct, rather short, median lobe in front. Anterior femur with a short, rather acute, triangular tooth, which is slightly dentate on outer margin. Anterior tibia strongly arcuate, with a rather broad tooth at apical third; middle and posterior tibiae straight.

Length 8 mm., width 3.25 mm.

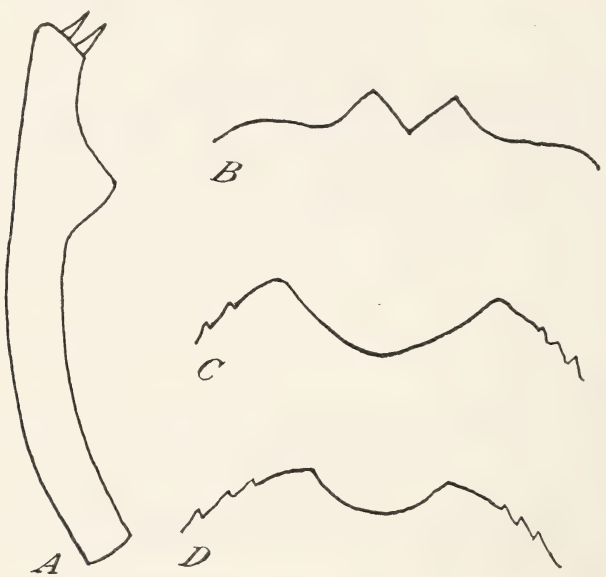

FIGURE 28.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris semisculpta*.

Redescribed from the male type of *contigua*, No. 2693, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—Differing from the male in having the front of the head uniformly cupreous and more sparsely pubescent, the antenna uniformly cupreous, the last visible sternite more narrowly, arcuately emarginate at apex, the eighth tergite densely, confluently punctate, and the anterior tibia unarmed.

Type locality.—Of *semisculpta* and *contigua*, California; types in the Museum of Comparative Zoology. Of *purpurifrons*, "St. Francisco"; type in the Zoological Museum at Moscow.

DISTRIBUTION

From the material examined:

CALIFORNIA: Placerville, June 16, 1916; Fallen Leaf (F. B. Herbert). Imperial County, 1911 (J. C. Bridwell). Summerdale (H. E. Burke). Truckee, August, 5,800 feet (H. F. Wickham). Lake Tahoe, July 10; Sisson (Hubbard and Schwarz). Yosemite, June 19, 1937, 3,800–4,000 feet; Stinson Beach, May 1934 (E. G. Linsley). Panamint Mountains, Inyo County, May 28, 1937; Idyllwild, June 26, 1936; Mt. Hamilton, June 2, 1933; Olympia, June 6, 1933; Ben Lomont, June 11, 1933 (M. Cazier). Sequoia National Park, November 26, 1935; Sonora, June 19, 1934 (D. De Leon).
IDAHO: Centerville, August 1905.
NEVADA: Lake Tahoe (Hubbard and Schwarz).
OREGON: Hidaway, July 27, 1913 (W. D. Edmonston). Phoenix (J. M. Miller). Grant County, July 9, 1914 (W. Robinson).
WASHINGTON: Easton (A. Koebele). Cle Elum, July 4, 1932 (W. W. Baker).

Chamberlin (1926) records the species from Arizona and Colorado, but the Arizona records refer to *cuprascens*, and probably the Colorado record should also be referred to that species.

Hosts.—The adults have been reared from western yellow pine (*Pinus ponderosa* Lawson) collected by Miller in Oregon, and from sugar pine (*Pinus lambertiana* Douglas) collected by Burke in California. Lange (1937) mentions it as occurring under the bark of the main trunk and branches of Jeffrey pine (*Pinus jeffreyi* "Oreg. Com.") in the Lassen National Forest in California; and Blaisdell (1892) records it as having been reared from the half-dead limbs of apple and live oak, but this record should probably be referred to *mali*. Chamberlin (1926) gives the host as lodgepole pine (*Pinus contorta* Loudon).

The color and sculpture on the dorsal surface of the body are rather uniform, but in a few specimens the pronotum is a little more cupreous or bronzy and the smooth spots are indicated as in *cuprascens*. The tooth on each side of the clypeal emargination is variable in length and in some of the examples the sides of the pronotum are nearly parallel and strongly sinuate at the middle. Care should be exercised in using as a diagnostic character the tooth on the anterior tibia of the male in this species. In some specimens it is acute at the apex as in *cuprascens*, whereas in others it is more elongate, and broadly rounded at the apex, this difference being found in specimens reared from the same piece of wood. The length is from 7.5 to 12 mm.

LeConte described *contigua* from a single male and *semisculpta* from a single female, both collected by Andrew Murray in California, but since *semisculpta* is the female of *contigua*, the former name should be used for this species, as it has page priority over *contigua*. The writer has been unable to examine the type of *purpurifrons*, but since the species in this group resemble one another so closely it is impossible to be sure of the identification of *purpurifrons*, and as *semisculpta* and *purpurifrons* were both described in the same year, it is uncertain which name has priority, so *semisculpta*, the type of which has been examined, is used for this species.

(29) Chrysobothris cuprascens LeConte

(Fig. 29; fig. 114, *F*)

Chrysobothris cuprascens LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 234–235; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1424; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90; Horn, 1883, Amer. Ent. Soc. Trans. 10: 287; 1886, Amer. Ent. Soc. Trans. 13: 79, 81, pl. 2, figs. 40–44; Wickham, 1891, Ent. News 2: 132; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 210; Fall, 1894, Ent. News 5: 98; Cockerell, 1898, N. Mex. Agr. Expt. Sta. Bul. 28: 152; Wickham, 1898, Iowa Univ. Lab. Nat. Hist. Bul. 4: 305; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 117; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 179; Woodworth, 1913, Guide to California Insects, p. 196; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 145; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 617.

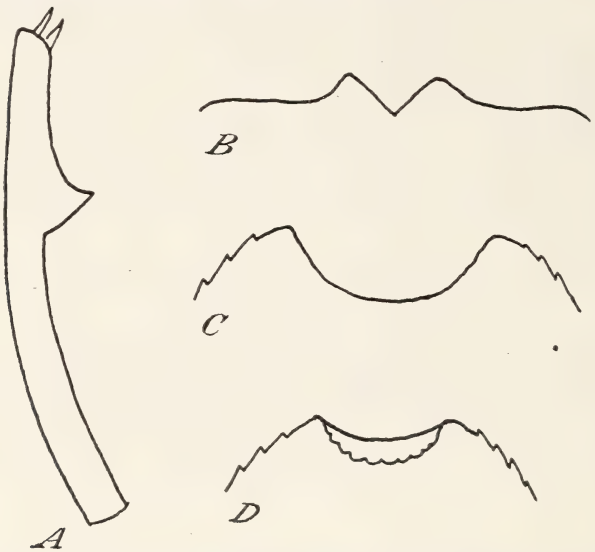

Figure 29.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris cuprascens*.

Male.—Moderately elongate, rather strongly depressed above, moderately shining, brownish cupreous, the pronotum slightly more reddish cupreous; beneath brownish cupreous, with a vague bronzy reflection, and more strongly shining than above.

Head bright bronzy green, becoming reddish cupreous on vertex and occiput, with a narrow, smooth, longitudinal carina on occiput; front slightly convex; surface coarsely, rather densely, deeply punctate, slightly, transversely rugose behind clypeus, sparsely clothed with moderately long, erect, fine, white hairs, intervals densely granulose; clypeus angularly notched at middle, on each side of emargination obtusely toothed, then transversely truncate externally. Antenna bronzy green, more or less piceous toward outer margins of segments, nearly equal in width to apex; intermediate segments compact, twice as wide as long, broadly rounded at outer margins; third segment subequal in length to following two segments united.

Pronotum twice as wide as long, subequal in width at base and apex, widest along middle; sides nearly parallel and strongly sinuate along middle, obliquely converging posteriorly and anteriorly; anterior margin slightly sinuate, with an indistinct median lobe; base strongly, arcuately emarginate on each side, the median lobe strongly produced and broadly rounded; disk slightly uneven, with a vague, longitudinal, median depression, and with four more or less distinct, small, irregular, smooth spots arranged transversely in front of middle; surface coarsely, deeply, but not very densely, punctate at middle, confluently punctate at sides, the intervals densely granulose.

Elytra at base wider than pronotum at middle, twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converg-

ing to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and very deep; humeral depressions broad and moderately deep; surface glabrous, slightly uneven, coarsely, irregularly punctate, more densely punctured toward sides, intervals vaguely granulose, with a few irregular, smooth spaces. Each elytron with three more or less distinct longitudinal costae; first distinctly elevated, extending along sutural margin from apex to basal third; second sinuate, broadly interrupted by two densely punctured, irregular, quadrate foveae, the first just in front of middle and the other at apical third; third costa short, interrupted posteriorly by second fovea, behind which it is joined to the second costa.

Abdomen beneath coarsely, deeply, rather densely fossulate-punctate, smooth along anterior and posterior margins of sternites, sparsely clothed at sides with short, recumbent, white hairs, with smooth, slightly elevated, lateral callosities, intervals densely granulose; last visible sternite broadly, arcuately emarginate at apex, without a distinct submarginal ridge, lateral margins coarsely serrate; eighth tergite coarsely serrate and vaguely notched at apex, coarsely, densely punctate, densely granulose, but not longitudinally carinate. Prosternum coarsely, confluently punctate, sparsely clothed with long, recumbent, white hairs, with a distinct, short, median lobe in front. Anterior femur with a very short, obtuse tooth, which is slightly dentate on outer margin. Anterior tibia arcuate, with a small, acute tooth at apical third; middle and posterior tibiae straight.

Length 8 mm., width 3.25 mm.

Redescribed from the male type, No. 2695, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—Differing from the male in having the front of the head uniformly cupreous, the antenna piceous, with a faint bronzy tinge, the prosternum more sparsely punctured and sparsely clothed with short, white hairs, the last visible sternite shallowly, arcuately emarginate at apex, the eighth tergite rounded at apex and more coarsely, confluently punctured, and the anterior tibia unarmed.

Type locality.—Santa Fe, N. Mex. Type simply labeled with a dark-green disk.

DISTRIBUTION

From material examined:

ARIZONA: Williams, May 27 to July 28; Bright Angel, July 10–11; Prescott, June 20 (Barber and Schwarz). Phoenix (W. Robinson). Grand Canyon, June 25 (E. G. Linsley). Pinal Mountains and Prescott, June–July, 1894 (H. F. Wickham).

COLORADO: Buena Vista, July 1–6, 1896, 7,900–8,000 feet; Salida, July 7 (H. F. Wickham).

NEW MEXICO: Las Vegas Hot Springs, August 4–14 (Barber and Schwarz). Estancia and Torrance County, 1925 (J. R. Douglass. Santa Fe, June (T. D. A. Cockerell). Albuquerque (H. F. Wickham).

UTAH: Beaver Creek Hills, Beaver County, June 20. Zion National Park, March 23, 1933, reared (D. De Leon).

It is recorded by Fall (1894, 1901) as abundant on pines in the San Bernardino Mountains, Calif., during July and August, and by Chamberlin (1926) from Davis Mountains, Tex., but no specimens have been examined from either of these States and these records are probably taken from misidentified specimens. The California record may refer to *semisculpta.*

Hosts.—This species has been reared from single-leaf pine (*Pinus monophylla* Torrey and Fremont) collected by D. De Leon in Utah, and the adults have been collected by Barber and Schwarz at Williams, Ariz., on western yellow pine (*Pinus ponderosa* Lawson) and alligator juniper (*Juniperus pachyphloea* Torrey).

The color and sculpture on the dorsal surface of the body are rather constant, except that in a number of specimens there are four more or less distinct, smooth spots arranged transversely on the

pronotum. The tooth on each side of the clypeal emargination is variable in length, sometimes becoming nearly obsolete. The tooth on the anterior tibia is variable in size, but is always acute at the apex. The length is from 7 to 10 mm.

LeConte described this species from a single male collected at Santa Fe, N. Mex., by Mr. Fendler. Horn (1886) states that *contigua* differs from *cuprascens* in having the clypeal teeth well marked and the tooth on the anterior tibia of the male rather broad and not very acute at the tip. These characters are variable and cannot be used for separating the two species. He also states that the tooth on the tibia is below the middle in *contigua* and one-third from the apex in *cuprascens*, but this statement is incorrect, as in all the specimens examined the tooth is one-third from the apex.

The writer is unable to find any character satisfactorily to separate *cuprascens* from *semisculpta* in the key, and there will be some difficulty in separating these species except by locality. *Chrysobothris semisculpta* seems to be confined to the Pacific coast. The specimens of *cuprascens* differ from those of *semisculpta* from Oregon and California in usually having the antenna wider and nearly equal in width to the apex, the callosity on each side of the last visible abdominal sternite more strongly elevated, and the male genitalia not so strongly expanded at the middle, with the soft lateral lobe on each side about one-fifth shorter than in *semisculpta*. The writer is undecided as to whether these two species are distinct, but it seems advisable to retain them until their habits and distribution are better known.

(30) CHRYSOBOTHRIS PENINSULARIS Schaeffer

(Fig. 30; fig. 115, *A*)

Chrysobothris peninsularis Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 207–208; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 165; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 645; Chamberlin, 1934, Pan-Pacific Ent. 10: 36.

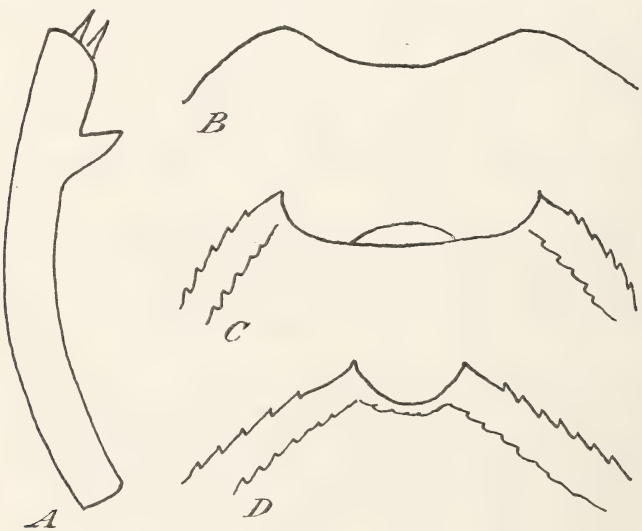

FIGURE 30.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris peninsularis*.

Male.—Moderately elongate, slightly convex above, moderately shining, uniformly dark brown, with a distinct purplish tinge; beneath purplish red and more strongly shining than above.

Head reddish brown, slightly greenish along lateral margins, with an obscure, smooth, longitudinal carina on occiput; front slightly convex; surface coarsely, but not deeply, confluently punctate, sparsely clothed with long, recumbent, whitish pubescence, intervals densely granulose; clypeus slightly, broadly, arcuately emarginate in front, arcuately rounded on each side. Antenna uniformly bronzy green, nearly equal in width to apex; intermediate segments about as long as wide, broadly rounded at outer margins; third segment slightly shorter than following two segments united.

Pronotum nearly twice as wide as long, narrower at apex than at base, widest along middle; sides strongly, arcuately converging near apical angles, subparallel along middle, slightly converging posteriorly; anterior margin broadly, arcuately emarginate, without a median lobe; base broadly, arcuately emarginate on each side, median lobe truncate in front of scutellum; disk moderately convex, with an indistinct, longitudinal, median depression; surface finely, uniformly punctate at middle, confluently punctate at sides.

Elytra at base slightly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to middle, then arcuately converging to tips, which are separately obtusely rounded; lateral margins strongly serrate posteriorly; basal depressions broad and shallow; humeral depressions very shallow; surface glabrous, finely, densely, uniformly punctate at middle, more densely, coarsely punctate at sides. Each elytron with three longitudinal costae; first straight, strongly elevated posteriorly, obsolete on basal third; second sinuate, extending from near apex to base, strongly elevated posteriorly, interrupted by premedian fovea; third short, strongly elevated, extending from basal third to behind middle, where it is interrupted by the postmedian fovea; and with three shallow, densely punctured foveae, one in front of middle, interrupting second costa, one just behind middle, interrupting third costa, and the other between first and second costae at apical fourth.

Abdomen beneath densely, coarsely, irregularly punctate (punctures more or less elongate), densely, finely granulose, sparsely clothed with long, recumbent, whitish hairs, with distinct, smooth, lateral callosities; sternites broadly, longitudinally concave at middle; last visible sternite with a coarsely serrate, submarginal ridge, apex with lower margin transversely truncate, with angles acutely prolonged, upper margin arcuately produced at middle, with lateral margins coarsely serrate; eighth tergite densely granulose, coarsely, sparsely punctate, with upper margin serrate and broadly emarginate at apex and lower margin entire, smooth, and arcuately emarginate at apex. Prosternum smooth at middle, coarsely, irregularly punctate at sides, and rather densely clothed with long, recumbent, whitish hairs; anterior margin broadly rounded, but not distinctly lobed. Anterior femur with a rather large triangular tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae arcuate, slightly dilated at apices, the former with a sharp tooth in front of dilation; posterior tibia sinuate.

Length 12 mm., width 5 mm.

Redescribed from the male type, No. 42638, in the United States National Museum.

Female.—Differing from the male in having the head uniformly brownish cupreous, the antenna piceous, with a faint bronzy tinge, the last visible sternite deeply, narrowly emarginate at apex, the eighth tergite deeply, transversely depressed at apex, which is produced into a long, curved tooth, fitting into the narrow emargination of the seventh sternite, the anterior tibia unarmed near apex, and the middle tibia straight.

Type locality.—San Felipe, Lower California.

DISTRIBUTION

From material examined:

ARIZONA: Hot Springs, June 25–28 (Barber and Schwarz). Tucson, August (H. F. Wickham and J. N. Knull). Sabino Canyon, October (G. Hofer). Base of Pinal Mountains, July 1930 (D. K. Duncan).
LOWER CALIFORNIA: San Felipe (G. Beyer).
TEXAS: Terlingua, May 25 (J. N. Knull).

Host.—Nothing is known of the larval habits of this species, but the adults have been collected by G. Hofer in Arizona on horsebean (*Parkinsonia* sp.).

Very little variation was found in the specimens examined, except in size and color. The specimens from Arizona are more bronzy brown and less purplish than the type from Lower California. The sides of the pronotum usually converge toward the base and apex, but in a few examples the sides are nearly parallel from the apical fourth to the base. Some specimens have the prosternum indistinctly lobed in front, and with two more or less distinct, smooth callosities on the front of the head. The length is from 11 to 14 mm.

This species was described from a single male collected by George Beyer.

(31) Chrysobothris texana LeConte

(Fig. 31; fig. 115, *B*)

Chrysobothris texana LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 234; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1428; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90; Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 96–97, pl. 5, figs. 130–134; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 221; Cockerell, 1898, N. Mex. Agr. Expt. Sta. Bul. 28: 152; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 118; Wickham, 1902, Iowa Univ. Lab. Nat. Hist. Bul. 5: 268; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 180; Woodworth, 1913, Guide to California Insects, p. 196; Burke, 1918, Jour. Econ. Ent. 11: 211; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 173; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 653–654; Chamberlin, 1934, Pan-Pacific Ent. 10: 36, 39, fig. 4.

Figure 31.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris texana.*

Male.—Moderately elongate, slightly flattened above, moderately shining, bronzy brown, with a faint cupreous reflection, pronotum more reddish cupreous; beneath purplish brown, slightly greenish along posterior margins of abdominal sternites, and more strongly shining than above.

Head reddish cupreous, greenish along anterior margin of clypeus, with two small, smooth callosities on front, and a narrow, longitudinal carina on occiput; front slightly convex, transversely depressed between antennal cavities; surface

coarsely, confluently punctate, more or less rugose, rather densely clothed with long, erect, inconspicuous hairs; clypeus broadly, shallowly, arcuately emarginate in front, broadly rounded on each side. Antenna brownish cupreous, gradually narrowed to apex; intermediate segments compact, as long as wide, subtruncate at outer margins; third segment nearly as long as following two segments united.

Pronotum nearly twice as wide as long, slightly wider at base than at apex, widest along middle; sides nearly parallel at middle, arcuately converging at base and apex; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base arcuately emarginate on each side, median lobe strongly produced, and truncate in front of scutellum; disk moderately convex, with a vague, longitudinal, median sulcus; surface rather finely, sparsely, irregularly punctate at middle, coarsely, confluently punctate at sides, intervals nearly smooth.

Elytra slightly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions very deep; humeral depressions broad and shallow; surface glabrous, densely, coarsely, irregularly punctate. Each elytron with four more or less distinct, smooth, longitudinal costae; first straight, extending from apex to base, strongly elevated posteriorly, more depressed and forming broad spaces toward base; second strongly interrupted and forming broad, smooth spaces; third sinuate, extending from near humerus to second costa at apical fourth, and interrupted behind middle; fourth scarcely indicated, following outline of lateral margin.

Abdomen beneath coarsely, sparsely, irregularly punctate, more densely punctate at sides, sparsely clothed with rather short, erect, white hairs, with more or less distinct, smooth, lateral callosities, intervals obsoletely granulose; last visible sternite semicircularly emarginate at apex, with a slightly elevated, dentate, submarginal ridge, lateral margins coarsely serrate; eighth tergite densely granulose, coarsely, sparsely punctate, deeply, narrowly, angularly emarginate at apex, but not longitudinally carinate. Prosternum smooth at middle, coarsely, densely punctate toward sides, sparsely clothed with long, erect, white hairs; anterior margin broadly rounded, with a short, wide, median lobe. Anterior femur with a large, obtuse tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae arcuate, the former with a broad dilation, which is abruptly narrowed near the apex, strongly constricted behind the dilation; posterior tibia straight.

Length 11.5 mm., width 4.75 mm.

Redescribed from a male in the United States National Museum, collected in Texas by Belfrage.

Female.—Differing from the male in having the prosternum more sparsely punctured and less densely pubescent, the last visible sternite narrowly notched at apex, the eighth tergite broadly rounded and denticulate at apex, the middle tibia nearly straight, and the anterior tibia unarmed near apex.

Type locality.—"Texas." Type not examined, recorded as being in the Ulke collection in Pittsburgh.

DISTRIBUTION

From material examined:

ARIZONA: Pine Dale, July 18. White Mountains, August–September (D. K. Duncan). Grand Canyon, March 30, 1935; Oak Canyon, November 22, 1935, reared (D. De Leon).
CALIFORNIA: Los Angeles County (D. W. Coquillett).
COLORADO: Estes Park, August 2, 1938 (D. De Leon).
NEBRASKA: Stapleton, June 8, 1938, reared (N. D. Wygant).
NEW MEXICO: Santa Fe, July 14, 1900 (J. F. Wielandy); June (T. D. A. Cockerell). Coolidge (H. F. Wickham).
TEXAS: No definite locality (Belfrage). Sabinal, April to May, 1910 (F. C. Pratt). Kerrville (H. Lacy). Dallas, September 23, 1926 (W. B. Wood).
UTAH: Parowan, June 15, 1935 (C. S. Sorenson). South Creek, Beaver County, June 22. Delle, July 2, 1920 (G. F. Knowlton). Mt. Carmel, April 11, 1935, reared (D. De Leon).

Hosts.—Adults have been reared from Utah juniper (*Juniperus utahensis* (Engelmann) Lemmon) and Arizona cypress (*Cupressus arizonica* Greene) collected in Arizona, and from the eastern red cedar (*Juniperus virginiana* Linnaeus) collected in Nebraska, and this species has been recorded by Burke (1918) as breeding in the bark and wood of dead and dying Rocky Mountain red cedar (*Juniperus scopulorum* Sargent) in Colorado.

The sculpture on the dorsal surface of the body is rather constant, but some specimens are more cupreous than others. The smooth spots on the front of the head are usually present, but occasionally specimens are found without the spots. The pronotum is usually widest along the middle and arcuately converging at the base and apex, but in some of the specimens examined it is widest at the apical fourth, with the sides obliquely converging posteriorly, and the disk is with or without a faintly indicated sulcus, and occasionally with from one to four indistinct, smooth spaces. The prosternum is always broadly rounded in front and usually the median lobe is distinct, but in a few examples it is scarcely indicated. The lateral callosities on the abdominal sternites are not elevated, and frequently are indistinct. The length is from 8 to 13.5 mm.

(32) CHRYSOBOTHRIS HELFERI, new species

(Fig. 32; fig. 115, *C*)

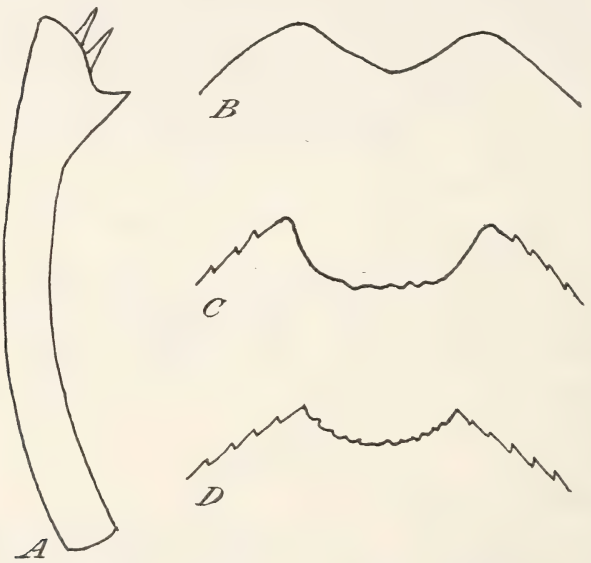

FIGURE 32.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris helferi.*

Male.—Broadly elongate, rather strongly depressed above, strongly shining; pronotum reddish cupreous; elytra with smooth elevations piceous, slightly greenish, and densely punctured areas reddish cupreous; beneath cupreous, with faint purplish and greenish reflections in different lights.

Head bronzy green, becoming brownish cupreous on occiput, with two small, irregular callosities on front, and a narrow, smooth, longitudinal carina on occiput; front slightly convex; surface coarsely, densely, irregularly punctate,

slightly rugose behind clypeus, rather densely clothed with long, erect, inconspicuous, whitish hairs, intervals obsoletely granulose; clypeus broadly, subangularly emarginate in front, obliquely subtruncate on each side. Antenna piceous, bronzy green basally, nearly equal in width to apex; intermediate segments rather compact, slightly wider than long, subtruncate at outer margins; third segment slightly longer than fourth.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest near apical third; sides arcuately converging toward apex, slightly, obliquely converging from apical third to posterior angles; anterior margin strongly sinuate, with a broadly rounded, median lobe; base angularly emarginate on each side, median lobe moderately produced and broadly rounded; disk moderately convex, with a shallow, median sulcus; surface coarsely, deeply, irregularly punctate at middle, more confluently punctate toward sides, intervals obsoletely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide; base of each elytron abruptly angulated at middle, transverse externally; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins strongly serrate; basal depressions broad and very deep; humeral depressions broad and shallow; surface glabrous, uneven, coarsely, densely, deeply, irregularly punctate between the elevated, sparsely punctate areas, intervals densely granulose. Each elytron with first costa strongly elevated on apical half, with numerous large, irregular, sparsely punctured, elevated spaces, and with large, transverse, irregular, densely punctured areas.

Abdomen beneath coarsely, sparsely, irregularly fossulate-punctate, sparsely clothed with rather short, recumbent, white hairs, with more or less distinct lateral callosities, intervals densely granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, without a distinct submarginal ridge, lateral margins coarsely serrate; eighth tergite sparsely, coarsely punctate, broadly rounded at apex. Prosternum coarsely, confluently punctate, more or less rugose, rather densely clothed with long, recumbent, white hairs; anterior margin transversely sinuate, without a median lobe. Anterior femur with a short, obtuse tooth, which is coarsely dentate on outer margin. Anterior tibia strongly arcuate, with a large, acute tooth near apex; middle tibia slightly arcuate; posterior tibia straight.

Length 7.5 mm., width 3 mm.

Female.—Differing from the male in having the front of the head uniformly reddish cupreous, the last visible sternite shallowly, broadly emarginate at apex, the eighth tergite densely punctured, and the anterior tibia slightly arcuate and unarmed near apex.

Type locality.—Los Angeles County, Calif.

Type material.—Type, allotype, and paratypes in the U. S. National Museum, No. 55294. Paratypes in the collections of Mont A. Cazier, J. R. Helfer, and William F. Barr.

Described from 54 specimens (one type). The male type, the allotype, and 5 paratypes were collected at the type locality during May by D. W. Coquillett; 1 paratype was collected at Coalinga, Calif., May 14, 1938, by M. Cazier; 45 paratypes were collected on California juniper (*Juniperus californica* Carrière) in the Tehachapi Mountains near Rosamund and Willow Springs, Calif., during May 1939 by J. R. Helfer; and 1 paratype was collected on *Juniperus* sp., at Kernville, Kern County, Calif., June 7, 1940, by W. F. Barr.

Variations.—The sculpture and color on the dorsal surface of the body are rather constant, except that the color on the smooth, elevated spaces on the elytra is slightly more greenish in some specimens than in others. The sides of the pronotum in many of the specimens are more or less sinuate and parallel at the middle, and in a few specimens there is a vague depression on each side of the pronotum near the lateral margin. The length is from 6.5 to 9 mm.

(33) Chrysobothris ignicollis Horn

(Fig. 33; fig. 115, *D*)

Chrysobothris ignicollis Horn, 1885, Amer. Ent. Soc. Trans. 12: 145; 1886, Amer. Ent. Soc. Trans. 13: 80, 82–83, pl. 3, figs. 51–55; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 214; Wickham, 1899, Ent. News 10: 122; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 180; Burke, 1918, Jour. Econ. Ent. 11: 210; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 158; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 637.

Chrysobothris scotti Chamberlin, 1938, Pan-Pacific Ent. 14: 11–12, figs. 5–8. (New synonymy.)

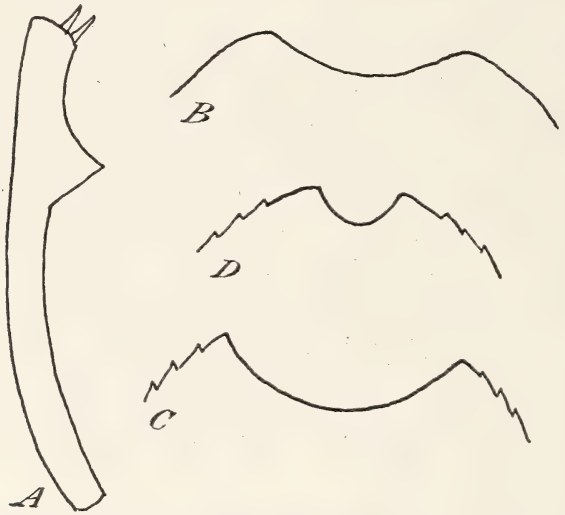

Figure 33.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris ignicollis*.

Male.—Broadly elongate, rather strongly depressed above; pronotum faintly reddish cupreous, subopaque; elytra piceous, with a slightly bronzy-green tinge, and moderately shining; beneath purplish cupreous, with a faint greenish tinge, more strongly shining than above.

Head brownish cupreous, becoming bronzy green toward clypeus, with a narrow, smooth, longitudinal carina on occiput, the carina bifurcate on vertex; front slightly convex; surface coarsely, deeply, confluently ocellate-punctate, densely clothed with long, recumbent, white hairs, intervals densely granulose; clypeus broadly, shallowly, arcuately emarginate in front, arcuately rounded on each side. Antenna piceous, with a faint bronzy tinge, nearly equal in width to apex; intermediate segments nearly twice as wide as long, rather compact, truncate at outer margins; third segment slightly shorter than following two segments united.

Pronotum three-fourths wider than long, subequal in width at base and apex, widest along middle; sides parallel or slightly sinuate along middle, arcuately converging toward apical angles, more strongly, obliquely converging toward posterior angles; anterior margin rather strongly sinuate, with a broadly rounded median lobe; base angularly emarginate on each side, the median lobe strongly produced and broadly rounded; disk moderately convex, without distinct depressions or callosities; surface coarsely, deeply, sparsely, irregularly punctate at middle, coarsely, confluently punctate at sides, intervals densely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide; base of each elytron not abruptly angulated at middle, but oblique externally; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and very deep; humeral depressions broad and shallow; surface glabrous, uneven, coarsely, deeply, irregularly ocellate-punctate, intervals finely granulose. Each elytron with the first costa strongly elevated from apex to middle, with numerous irregular, sparsely punctured, elevated spaces, and with large, transverse, irregular, densely punctured areas.

Abdomen beneath coarsely, sparsely, irregularly fossulate-punctate, more densely punctate at sides, sparsely clothed with short, recumbent, white hairs, with distinct, smooth, lateral callosities, intervals indistinctly granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, with a slightly serrate, submarginal ridge, lateral margins coarsely serrate; eighth tergite slightly emarginate at apex, coarsely, sparsely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, slightly rugose anteriorly, with a narrow, smooth, median space, rather densely clothed with long, semierect, white hairs; anterior margin arcuately rounded at middle, but without a distinct median lobe. Anterior femur with a short, obtuse tooth, which is dentate on outer margin. Anterior tibia slightly arcuate, with a large, acutely triangular tooth at apical third; middle tibia slightly arcuate, and slightly expanded at apex; posterior tibia straight.

Length 7.5 mm., width 3 mm.

Redescribed from the male lectotype, No. 3431, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the front of the head uniformly reddish cupreous, moderately convex, and more sparsely punctured and less pubescent, the antenna uniformly piceous, the last visible sternite more elongate, and narrowly, arcuately emarginate at apex, the eighth tergite coarsely, densely punctured, the prosternum coarsely, sparsely punctured and sparsely pubescent, the anterior tibia unarmed, and the middle tibia straight.

Type locality.—Of *ignicollis*, Colorado, no definite locality. Of *scotti*, Taos, N. Mex.; type in the collection of W. J. Chamberlin.

DISTRIBUTION

From material examined:

ARIZONA: Santa Catalina Mountains (M. Chrisman, and F. C. Craighead). Rock Canyon and Sabino Canyon (G. Hofer). Santa Rita Mountains, June 6 (Hubbard and Schwarz). Miller Canyon, Huachuca Mountains, June 7, 1907 (H. A. Kaeber). Ash Fork, June 18; Bright Angel, July 10 (Barber and Schwarz). Palmerlee, Cochise County, July. White Mountains, July 11, 1936 (F. H. Parker).

COLORADO: No definite locality (Hubbard and Schwarz). Fort Garland (A. D. Hopkins).

IDAHO: Pocatello, June 24, 1904 (E. S. G. Titus).

NEW MEXICO: Meek, April 27, 1907 (W. F. Fiske). Capitan, July 26, 1907 (J. L. Webb). Coolidge (H. F. Wickham). Santa Fe, May 6 (H. S. Barber). Taos, type *scotti* (F. T. Scott).

TEXAS: No definite locality (Belfrage). Montell, April 2, 1907 (W. F. Fiske).

UTAH: Beaver Creek Hills and South Creek, Beaver County, June. Green Canyon, April 22, 1934 (T. O. Thatcher). St. George, May 28, 1935 (E. C. Van Dyke). Mt. Carmel, March 30, 1934 (D. De Leon).

Chamberlin (1926) records it from other localities in Arizona, Colorado, New Mexico, and Utah, and also from California and Nevada, but no specimens have been examined by the writer from California or Nevada.

Hosts.—Adults have been reared from cypress (*Cupressus* sp.) collected by F. C. Craighead in Arizona, from *Vauquelinia californica* (Torrey) Sargent collected by G. Hofer in the same State, and from Utah juniper (*Juniperus utahensis* (Engelmann) Lemmon) collected by D. De Leon in Utah. Burke (1918) records the larvae mining the bark and sapwood of dead and dying Rocky Mountain red cedar (*Juniperus scopulorum* Sargent) and alligator juniper (*Juniperus pachyphloea* Torrey) in Arizona and Colorado. The adults have been collected on one-seed juniper (*Juniperus monosperma* (Engelmann) Sargent) and mountain cedar (*Juniperus mexicana* Sprengel). Chamberlin (1926) also records the species from Port Orford cedar (*Chamaecyparis lawsoniana* (A. Murray) Parlatore).

The sculpture on the dorsal surface of the body is rather constant, but the color is variable. The pronotum is usually more reddish cupreous than the elytra, but occasionally specimens are found with the pronotum of the same color as the elytra, and the densely punctured areas on the elytra vary from brownish cupreous to bronzy green. The front of the head is rarely uniformly greenish or brownish cupreous, and often with the longitudinal carina bifurcate anteriorly, and with smooth callosities. The pronotum is usually parallel-sided, slightly sinuate at the middle, but in a few specimens it is widest at the apical third, with the sides obliquely converging posteriorly, and arcuately constricted at the base, and with a shallow median sulcus on the disk. In most specimens the prosternum is rounded in front, but occasionally specimens are found with an indistinct median lobe. The eighth abdominal tergite is either rounded or vaguely emarginate at the apex. The length is from 6.5 to 10 mm.

Through the kindness of Dr. Chamberlin the writer was able to examine the types of *scotti*, and with the small series available was unable to separate it from *ignicollis*. Chamberlin in his description states that the anterior tibia of the male has a very prominent, obtuse tooth about one-third from the apex, and that *scotti* differs from *ignicollis* "by the duller color, front [of head] bronze not green as in the latter; the very large tooth [on the anterior tibia of the male] fully one-third from the tip, whereas in *ignicollis* the smaller tooth is about one-fifth from the tip of the tibiae." In a large series of *ignicollis* examined (including the type) the color on the front of the head and the dorsal surface of the body is variable, and the tooth on the anterior tibia of *scotti* and of *ignicollis* is of the same shape and in the same position in both types. The genitalia are identical in both species.

(34) Chrysobothris speculifer Horn

(Fig. 34; fig. 115, *E*)

Chrysobothris speculifer Horn, 1886, Amer. Ent. Soc. Trans. 13: 80, 83–84, pl. 3, figs. 56–60; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 221; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 117; Wickham, 1902, Iowa Univ. Lab. Nat. Hist. Bul. 5: 268; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 172; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 652.

FIGURE 34.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris speculifer.*

Male.—Broadly elongate, rather strongly depressed above, strongly shining, uniformly reddish to purplish cupreous; beneath uniformly cupreous, and more strongly shining than above.

Head brownish cupreous, with two small, irregular callosities on front, and a narrow, smooth, longitudinal carina on occiput, carina bifurcate on vertex; front moderately convex, surface confluently, coarsely, deeply ocellate-punctate, sparsely clothed with long, semierect, whitish hairs, intervals densely granulose; clypeus broadly, shallowly, subangularly emarginate in front, arcuately rounded on each side, with a distinctly elevated submarginal ridge parallel with emargination. Antenna piceous, bronzy green basally, slightly narrowed to apex; intermediate segments not compact, slightly wider than long, subtruncate at outer margins; third segment slightly longer than fourth.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest at middle; sides arcuately converging anteriorly, more strongly converging posteriorly, slightly constricted at base; anterior margin sinuate, with a broadly rounded median lobe; base strongly angularly emarginate on each side, median lobe moderately produced and broadly rounded; disk moderately convex, with a shallow, irregular depression on each side near lateral margin, and a vague median sulcus, and with an obsolete, narrow, smooth space opposite middle of each elytron; surface coarsely, deeply, irregularly punctate, more densely punctate at sides, intervals densely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide; base of each elytron not abruptly angulated at middle, but oblique externally; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins strongly serrate; basal depressions broad and very deep, limited externally by a strongly elevated carina; humeral depressions shallow and broad; surface glabrous, uneven, coarsely, densely, deeply, irregularly punctate between the elevated, sparsely punctate areas, intervals densely granulose. Each elytron with first costa strongly elevated from apex to middle, with numerous irregular, sparsely punctate, elevated spaces, and large, transverse, irregular, densely punctured areas.

Abdomen beneath coarsely, densely, irregularly fossulate-punctate, sparsely clothed with rather short, recumbent, white hairs, with more or less distinct lateral callosities, intervals densely granulose; last visible sternite broadly,

deeply, arcuately emarginate on lower margin at apex (upper margin transversely truncate), with a slightly serrate submarginal ridge, lateral margins coarsely serrate; eighth tergite coarsely, sparsely punctate, lower margin rounded at apex, upper margin angularly produced at apex. Prosternum sparsely, coarsely, irregularly punctate, sparsely clothed with long, semierect, white hairs; anterior margin slightly deflexed, slightly rounded at middle, but without a distinct median lobe. Anterior femur with a short, obtuse tooth, which is dentate on outer margin. Anterior and middle tibiae arcuate, the former with a short, broad, angular tooth near apex, the latter slightly expanded at apex; posterior tibia straight.

Length 6.5 mm., width 2.75 mm.

Redescribed from the male lectotype, No. 3432, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the front of the head uniformly reddish cupreous, the abdomen beneath more strongly convex, the last visible sternite more elongate, and shallowly, broadly, arcuately emarginate at apex, the eighth tergite more densely punctured, and rounded or slightly emarginate at apex, the middle tibia straight, and the anterior tibia unarmed near apex.

Type locality.—Colorado, no definite locality.

DISTRIBUTION

From material examined:

ARIZONA: Ashfork, June 18; Williams, May 28 to June 16 (Barber and Schwarz).
COLORADO: No definite locality. Lectotype (Horn collection).
NEW MEXICO: Estancia, 1925 (J. R. Douglass).
TEXAS: No definite locality (Horn collection). Alpine, June 10, 1930 (E. G. Linsley).
UTAH: South Creek, Beaver County, June 22.

Fall (1901) and Chamberlin (1926) record *speculifer* from California, but no specimens from that State have been examined by the writer, and these records probably refer to *helferi* Fisher.

Host.—The larval habits are unknown, but Linsley collected the adults on *Juniperus* sp. at Alpine, Tex.

The sculpture on the dorsal surface of the body is rather constant, but the color on the pronotum varies from reddish cupreous to brownish cupreous, the smooth spaces on the elytra from greenish black to reddish purple, and the densely punctured areas on the elytra are usually more reddish cupreous than the elevated smooth spaces. The head is usually bronzy green on the front, becoming brownish cupreous on the occiput, and occasionally the submarginal ridge is obsolete. The sides of the pronotum are usually parallel and slightly sinuate at the middle, but occasionally the pronotum is widest at the apical third, with the sides obliquely converging posteriorly, and in most of the specimens examined the median sulcus and callosities at base are obsolete. The prosternum is smooth at the middle in some of the specimens. The length is from 5.5 to 10 mm.

Chamberlin (1926) gives the type locality as California. This is an error, as Horn did not have any specimens from California when he described the species.

(35) Chrysobothris iris Van Dyke

(Fig. 35; fig. 115, *F*)

Chrysobothris iris Van Dyke, 1937, Brooklyn Ent. Soc. Bul. 32: 110–111.

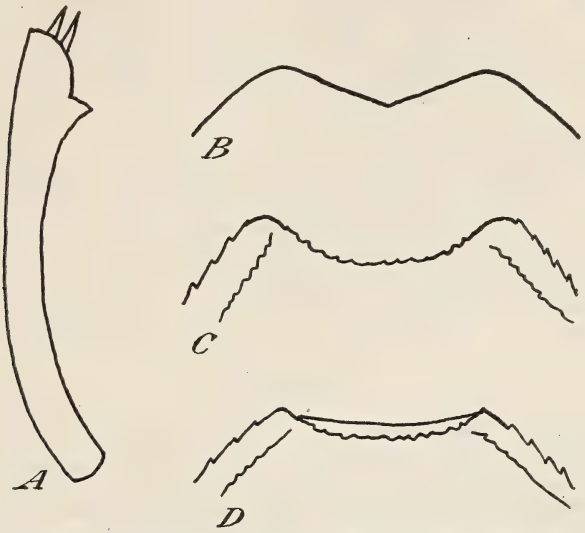

Figure 35.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris iris*.

Male.—Broadly elongate, rather strongly convex above, strongly shining; pronotum reddish cupreous; elytra aeneous, with a greenish reflection on basal halves, and reddish cupreous, often with a purplish tinge on apical halves; beneath purplish.

Head bronzy green, becoming reddish cupreous on occiput, with two small, smooth callosities on front, and a narrow, smooth, longitudinal carina on occiput; front slightly convex; surface coarsely, deeply foveolate-punctate, sparsely clothed with moderately long, recumbent, white hairs, the intervals densely granulose; clypeus broadly, shallowly, subangularly emarginate in front, broadly rounded on each side. Antenna piceous, slightly bronzy basally, gradually narrowed to apex; intermediate segments not very compact, distinctly wider than long, broadly rounded at outer margins; third segment nearly as long as following two segments united.

Pronotum nearly twice as wide as long, slightly wider at apex than at base, widest at apical third; sides arcuately rounded anteriorly, obliquely converging from apical third to posterior angles; anterior margin slightly sinuate, with a broadly rounded median lobe; base deeply, angularly emarginate on each side, median lobe strongly produced and broadly rounded; disk rather strongly convex, with a vague, longitudinal, median depression, and a shallow depression on each side near lateral margin; surface coarsely, deeply, sparsely, irregularly punctate at middle, more coarsely, confluently ocellate-punctate at sides, intervals finely, densely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, than arcuately converging to tips, which are separately broadly rounded; lateral margins strongly serrate; base of each elytron not abruptly angulated at middle, oblique externally; basal depressions broad and very deep; humeral depressions broad and shallow; surface glabrous, uneven, coarsely, densely, deeply, irregularly punctate between sparsely punctured, elevated areas, intervals obsoletely granulose. Each elytron with first costa strongly elevated on apical half, with numerous large, transverse, irregular, sparsely punctured, elevated spaces, and with large, transverse, irregular, densely punctured areas.

Abdomen beneath sparsely, coarsely, irregularly fossulate-punctate, sparsely clothed with rather short, recumbent, white hairs, with more or less distinct lateral callosities, intervals finely granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, with a rather distinct, serrate, submarginal ridge, lateral margins coarsely serrate; eighth tergite coarsely, sparsely punctate, lower margin rounded or slightly emarginate at apex, upper margin angularly produced at apex. Prosternum coarsely, densely, irregularly punctate, sparsely clothed with long, recumbent, whitish hairs; anterior margin broadly rounded, but without a distinct median lobe. Anterior femur with a short, rather acute tooth, which is coarsely dentate on outer margin. Anterior tibia strongly arcuate, with a rather acute tooth near apex; middle tibia slightly arcuate; posterior tibia straight.

Length 7.5 mm., width 3 mm.

Female.—Differing from the male in having the front of the head uniformly reddish cupreous, the last visible sternite shallowly emarginate at apex, the eighth tergite densely, coarsely punctate, and broadly rounded at apex, the middle tibia straight, and the anterior tibia unarmed near apex.

Redescribed from a pair of paratypes donated to the United States National Museum by E. C. Van Dyke.

Type locality.—St. George, Utah; type in the California Academy of Sciences.

DISTRIBUTION

From material examined:

UTAH: St. George, June 28, 1935; Mt. Carmel, near Zion Canyon, May 30, 1935 (E. C. Van Dyke).

NEVADA: Esmeralda County, June 27, 1907 (F. W. Nunenmacher).

Host.—The larval habits are not known, but Dr. Van Dyke collected his large type series of adults on juniper (*Juniperus* sp.), which is probably the host for this species.

Very little variation was observed in the small number of specimens examined, and Van Dyke states that the color is quite stable in the large type series. Some of the specimens have the pronotum widest at the apical third, with the sides converging posteriorly, whereas in others the sides are parallel and slightly sinuate at the middle and more or less constricted at the base. The median and lateral depressions on the pronotum are sometimes obsolete. The length is from 7 to 8.5 mm.

There is some doubt about this being a valid species. The genitalia, tooth on anterior tibia of male, and sculpture are similar to those of *speculifer*, and the writer has been unable to find any characters for separating it from that species except color, which according to Van Dyke is constant in a large series; so it is retained as a valid species until more material is available for study and its habits and distribution are better known.

(36) CHRYSOBOTHRIS VIRIDICYANEA Horn

(Fig. 36; fig. 116, *A*)

Chrysobothris viridicyanea Horn, 1886, Amer. Ent. Soc. Trans. 13: 80, 84, pl. 3, figs. 61–65; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 222; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 18; Woodworth, 1913, Guide to California Insects, p. 196; Chamberlin, 1917, Ent. News 28: 138; Van Dyke, 1924, Pacific Coast Ent. Soc. Proc. 2: 18; Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 191 (separate, p. 190); 1926, Cat. Buprestidae North Amer., p. 176; 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 657.

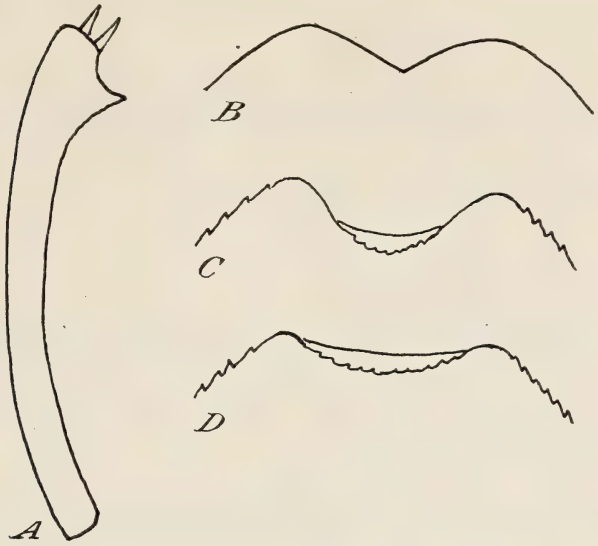

FIGURE 36.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris viridicyanea.*

Male.—Broadly elongate, strongly depressed above, moderately shining, bright green, with a faint golden or bluish tinge in different lights; beneath similar in color to above, but more strongly shining.

Head golden green, with a smooth longitudinal carina on occiput; front slightly convex; surface coarsely, confluently punctate, sparsely clothed with long, erect, inconspicuous hairs, intervals finely granulose; clypeus broadly, rather deeply, triangularly emarginate in front, arcuately rounded on each side. Antenna bronzy green, with a faint cupreous tinge, slightly narrowed to apex; intermediate segments compact, wider than long, broadly rounded at outer margins; third segment as long as following two segments united.

Pronotum nearly twice as wide as long, wider at base than at apex, widest near apex; sides nearly parallel along middle, arcuately converging toward apex and base; anterior margin strongly sinuate, with a distinct, broadly rounded, median lobe; base strongly, angularly emarginate on each side, with median lobe strongly produced and broadly rounded; disk slightly convex, with a vague median depression, but without elevated, smooth callosities; surface nearly glabrous, sparsely, irregularly punctate at middle, more coarsely, confluently punctate at sides, intervals finely, densely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins finely serrate; basal depression very deep; humeral depressions shallow; disk uneven, slightly convex; surface glabrous, rather coarsely, densely punctate, very irregular in places, with transverse, smooth spaces at apical third and behind middle, and each elytron with a distinctly elevated, smooth costa extending along sutural margin from apex to middle of elytron.

Abdomen beneath coarsely, sparsely, irregularly punctate, sparsely clothed with short, recumbent, whitish hairs, without smooth lateral callosities, intervals obsoletely granulose; last visible sternite deeply, arcuately emarginate at apex, without a distinct submarginal ridge, lateral margins finely serrate; eighth tergite slightly emarginate at apex, densely granulose, coarsely, sparsely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, rather densely clothed with long, semierect, whitish hairs; anterior margin without a median lobe. Anterior femur with a short, obtuse tooth, which is dentate on outer margin. Anterior and middle tibiae slightly arcuate, the former with a large triangular tooth at apex; posterior tibia straight.

Length 8.5 mm., width 3.75 mm.

Redescribed from the male lectotype, No. 3433, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the front of the head more sparsely pubescent, the prosternum more sparsely punctured and not quite so densely pubescent, the last visible sternite more elongate and shallowly, broadly, arcuately emarginate at apex, the middle tibia straight, and the anterior tibia unarmed at apex.

Type locality.—Nevada, no definite locality.

DISTRIBUTION

From material examined:

CALIFORNIA: Fallen Leaf Lake, July 14, 1925. Shasta County (D. W. Coquillett). Willow Ranch and Pinecrest (G. R. Struble). Yosemite, altitude 3,880–4,000 feet, June 14, 1928 (E. G. Linsley). Shasta National Forest, May 10, 1934, and Devil's Garden, May 23, 1931 (F. A. Salmon). Placerville, June 10, 1915 (H. E. Burke). Carrville, Trinity County, 2,400–2,500 feet altitude, June 15, 1934.
NEVADA: No definite locality (lectotype).
OREGON: Ashland, July 3, 1917 (T. E. Snyder). Klamath Falls, June 4, 1934; Warner Valley, July 1, 1935 (McLeod coll.).

Chamberlin (1926) records *viridicyanea* from other localities in California and Oregon, and Horn (1886) records it from Montana, but no specimens from Montana have been examined by the writer, and this locality record should be verified.

Hosts.—Chamberlin (1917) records this species as breeding in the limbs and smaller branches of incense cedar (*Libocedrus decurrens* Torrey) in California, and (1925) records it in western juniper (*Juniperus occidentalis* Hooker) in Oregon. The adults have been collected on Douglas fir (*Pseudotsuga taxifolia* (La Marck) Britton), Jeffrey pine (*Pinus jeffreyi* "Oreg. Com."), and Port Orford cedar (*Chamaecyparis lawsoniana* (A. Murray) Parlatore).

The sculpture on the dorsal surface of the body is slightly variable, and the color varies from bright green to violaceous blue. In some of the specimens there are two more or less distinct, smooth callosities on the front of the head, and the emargination at the apex of the last visible abdominal sternite of the female is slightly variable in width. In a few specimens there is a very narrow median lobe on the prosternum. The length is from 7.5 to 11 mm.

(37) CHRYSOBOTHRIS NEOPUSILLA, new species

(Fig. 37)

This species is closely allied to *pusilla* Castelnau and Gory but it differs from that species as follows:

Male.—Head, and antenna in part, bright green, and the genitalia more strongly expanded at the middle, more uniformly brown in color, with the median lobe broadly rounded at the apex, and the transparent parts of the lateral lobes much shorter than in *pusilla*.

Female.—Last visible abdominal sternite rather deeply, arcuately emarginate at the apex, whereas in *pusilla* it is rounded or shallowly emarginate at the apex.

Length 6.5–8.5 mm., width 3–4 mm.

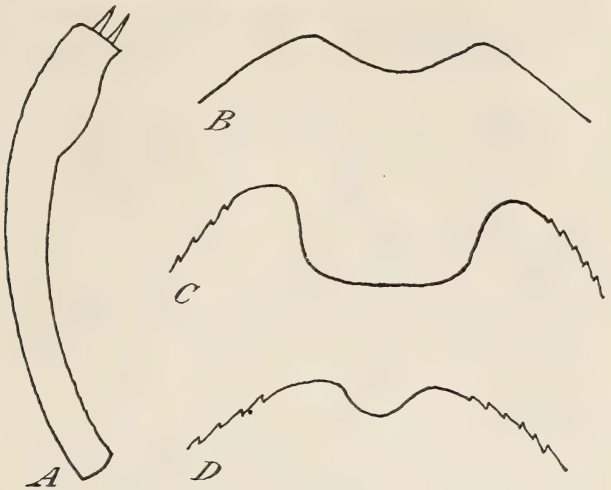

FIGURE 37.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris neopusilla*.

Type locality.—Pennington Gap, Va.

Type material.—Type, allotype, and paratypes in the United States National Museum, No. 55295.

Described from 14 specimens (one male type). The type, allotype, and 8 paratypes were collected in wasp cells in a clay bank at the type locality, July 4, 1879, by H. G. Hubbard; 1 paratype from West Virginia, collected September 17, 1890, by A. D. Hopkins; 1 paratype labeled Syracuse, N. Y., June 9, 1924; and 2 paratypes were reared from southern balsam fir (*Abies fraseri* (Pursh) Poiret) collected at Tryon, N. C., by W. F. Fiske. The specimens from North Carolina are slightly more greenish than the ones from Virginia.

(38) CHRYSOBOTHRIS PUSILLA Castelnau and Gory

(Fig. 38; fig. 116, *B*)

Chrysobothris pusilla Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, pp. 53–54, pl. 10, fig. 72; LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 236; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1427; Harrington, 1884, Canad. Ent. 16: 71; Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 97–98, pl. 5, figs. 140–144; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 218; Hopkins, 1899, W. Va. Agr. Expt. Sta. Bul. 56: 437; Felt, 1905–1906, N. Y. State Mus. Mem. 8: 649, 658, pl. 20, fig. 9; Blatchley, 1910, Coleoptera of Indiana, pp. 789, 791; Smith, 1910, N. J. State Mus. Rpt. 1909: 293; Manee, 1913, Ent. News 24: 170; Knull, 1920, Ent. News 31: 6; 1922, Canad. Ent. 54: 83; 1925, Ohio State Univ. Studies 2: 3, 28, 33; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 167–168; Leonard, 1928, N. Y. (Cornell) Agr. Expt. Sta. Mem. 101: 360; Chamberlin, 1934, Pan-Pacific Ent. 10: 38, 40, fig. 8; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 646–647; Procter, 1938, Biol. Survey Mt. Desert Island, pt. 6, p. 123; Brimley, 1938, Insects of North Carolina, p. 172.

Chrysobothris aegrota Dejean, 1833, Cat. Coléopt., ed. 2, p. 80, and 1836, ed. 3, p. 90 (no description).

Chrysobothris biguttata Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, pl. 10, fig. 72, addenda p. 7 (listed in text as *pusilla* and on plate as *biguttata*, corrected in addenda).

Buprestis strangulata Harris, 1835, *in* Hitchcock, Rpt. on Geol., etc., Mass., ed. 2, p. 558 (no description).
Chrysobothris strangulata Melsheimer, 1844, Acad. Nat. Sci. Phila. Proc. 2: 147.

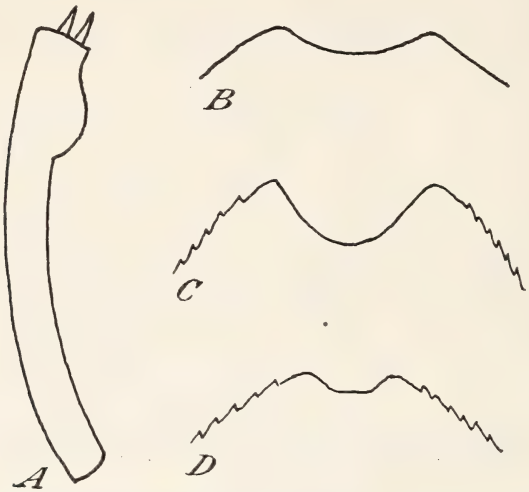

FIGURE 38.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris pusilla.*

Male.—Moderately elongate, slightly convex above, moderately shining, dark bronzy brown, with depressions and punctures cupreous; beneath brownish cupreous, with a faint bronzy tinge, and more strongly shining than above.

Head bronzy brown, becoming brownish cupreous on occiput, with two vague, smooth callosities on front, and a narrow, smooth, longitudinal carina on occiput; front nearly flat; surface coarsely, deeply, rather densely punctate, sparsely clothed with short, semierect hairs, intervals densely granulose; clypeus broadly, shallowly, arcuately emarginate in front, subtruncate on each side. Antenna uniformly bronzy brown, slightly narrowed to apex; intermediate segments subtriangular, compact, slightly wider than long, broadly rounded at outer margins; third segment nearly as long as following two segments united.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest along middle; sides nearly parallel at middle, arcuately converging toward base and apex; anterior margin broadly, arcuately emarginate, without a distinct median lobe; base arcuately emarginate on each side, median lobe slightly produced, and subtruncate in front of scutellum; disk slightly uneven, with a vague, longitudinal, median depression, a few obsolete depressions on each side, and with more or less distinct, small, smooth callosities; surface coarsely, irregularly punctate, more densely at sides, intervals feebly granulose.

Elytra slightly wider than pronotum, twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, coarsely, rather densely, irregularly punctate, intervals finely granulose. Each elytron with four more or less distinct longitudinal costae; first rather distinct from apex to basal third; second and third irregular, interrupted by the vague foveae, and more or less connected transversely to each other and the first costa by elevated, smooth spaces; third barely indicated, following outline of lateral margin; and with two obsolete foveae, one in front of middle interrupting second costa, and an oblique one behind middle, interrupting second and third costae.

Abdomen beneath finely, irregularly punctate, more densely at sides, sparsely clothed with short, recumbent, white hairs, without lateral callosities, inter-

vals finely granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite slightly emarginate at apex, coarsely, sparsely punctate, but not longitudinally carinate. Prosternum coarsely, densely punctate, sparsely clothed with long, erect, white hairs; anterior margin broadly rounded, with a short, broad, median lobe. Anterior femur with a short, broadly triangular tooth, which is slightly dentate on outer margin. Anterior and middle tibiae arcuate, the former with a small, rounded dilation at apex; posterior tibia straight.

Length 7 mm., width 2.75 mm.

Redescribed from a male in the U. S. National Museum, collected at West Point, N. Y., June 18, 1911, by W. Robinson.

Female.—Differing from the male in having the front of the head uniformly brownish cupreous and more sparsely pubescent, the last visible sternite more elongate and shallowly emarginate at apex, the eighth tergite broadly rounded at apex and more coarsely, sparsely punctured, and indistinctly pubescent, and the anterior tibia unarmed at apex.

Type locality.—Of *pusilla*, "Amérique Boréale"; type supposed to be in the collection of René Oberthür, but not examined by the writer. Of *aegrota*, "Amer. bor.," and of *strangulata*, Pennsylvania; present location of these types unknown to writer.

Distribution.—This species is widely distributed over the eastern part of the United States but has not been found west of the Mississippi River. Material has been examined from the District of Columbia and various localities in the following States: Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Pennsylvania, Virginia, and West Virginia.

It has also been recorded in the literature from Alabama and from Ontario, Canada.

Hosts.—Knull (1920, 1921) records *pusilla* as breeding in the sapwood on dead branches of pitch pine (*Pinus rigida* Miller) and eastern hemlock (*Tsuga canadensis* (Linnaeus) Carrière) collected in Pennsylvania. Hopkins (1899) reared the adults from larvae found in spruce (*Picea* sp.) bark collected in West Virginia. Chamberlin (1926) records the hosts as white spruce (*Picea glauca* (Moench) Voss), northern white pine (*Pinus strobus* Linnaeus), and shortleaf pine (*Pinus echinata* Miller). The above records from *Picea* by Hopkins and Chamberlin may refer to *neopusilla.*

The color on the dorsal surface of the body is usually rather constant, but occasionally specimens are found that are more cupreous, in which case the foveae on the elytra are more greenish. In many cases the pronotum is widest near the apex, with the sides strongly converging posteriorly, the median depression on the disk obsolete, and the anterior margin is without or with an indistinct median lobe. The sides of the elytra are either parallel or slightly diverging from the humeral angles to the apical third. The foveae on the elytra are more distinct and more strongly depressed in some examples, whereas in others the costae and foveae are scarcely visible. The length is from 6.25 to 8 mm.

LeConte (1859), after examining the type of *pusilla* in Europe, placed *strangulata* Melsheimer as a synonym of that species.

(39) Chrysobothris lateralis Waterhouse

(Fig. 39; fig. 116, *C*)

Chrysobothris lateralis Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, p. 47, pl. 3, fig. 20, and 1889, v. 3, pt. 1, p. 185; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 215; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 159; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 638.

Chrysobothris debilis Horn, 1886, Amer. Ent. Soc. Trans. 13: 72, 75 (part); Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, pp. 47–48; Burke, 1918, Jour. Econ. Ent. 11: 210 (part); Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 145–146 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 618 (part).

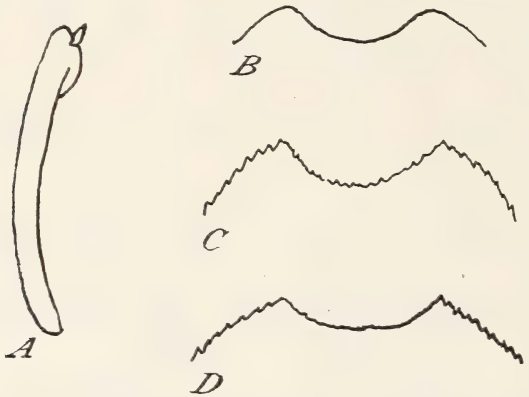

Figure 39.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris lateralis*.

Male.—Moderately elongate, rather strongly convex above; moderately shining, reddish brown, with sides of pronotum and foveae on elytra bright reddish cupreous; beneath purplish or greenish black, with a faint cupreous reflection in different lights.

Head reddish cupreous, becoming greenish on clypeus, with two small, smooth, irregular callosities on front, and a narrow longitudinal carina on occiput, the carina slightly bifurcate anteriorly; front slightly convex; surface coarsely, shallowly, densely punctate, obscurely, transversely rugose behind clypeus, rather densely clothed with long, recumbent, white hairs, intervals densely granulose; clypeus deeply, semicircularly emarginate in front, arcuately rounded on each side. Antenna uniformly brownish cupreous, not distinctly narrowed to apex; intermediate segments slightly wider than long, broadly rounded at outer margins; third segment slightly shorter than following two segments united.

Pronotum nearly twice as wide as long, narrower at base than at apex, widest near apex; sides converging from near apical angles to posterior angles, more strongly on basal third; anterior margin sinuate, with an indistinct, broadly rounded, median lobe; base slightly, arcuately emarginate on each side, median lobe slightly produced and broadly rounded; disk moderately convex, without a median depression or smooth callosities; surface finely, sparsely, shallowly punctate, punctures well separated over entire surface, more or less rugose at sides, intervals densely, finely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and shallow; humeral depressions indistinct; surface glabrous, coarsely, densely punctate, more or less rugose toward base, intervals densely, finely granulose. Each elytron with three more or less distinct longitudinal costae; first slightly elevated on apical half, curving away from sutural margin

near apex; second extending from median fovea to near apex; third vaguely indicated posteriorly along lateral margin; and with three reddish-cupreous foveae, one in front of middle and two near apical third.

Abdomen beneath coarsely, sparsely punctate, smooth along anterior and posterior margins of sternites, densely clothed at sides with long, recumbent, white hairs, without smooth lateral callosities, the intervals finely, densely granulose; last visible sternite deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite densely granulose, coarsely, sparsely punctate, deeply, narrowly emarginate at apex, but not longitudinally carinate. Prosternum coarsely, confluently punctate, more or less rugose, densely clothed with long, recumbent, white hairs, with a distinct, long, median lobe in front. Anterior femur with a large, acutely triangular tooth, which is coarsely dentate on outer margin. Anterior tibia arcuate, with a short, rounded dilation at apex; middle and posterior tibiae straight.

Length 6 mm., width 2.25 mm.

Redescribed from a male in the United States National Museum labeled "Arizona, Morrison," which is probably a specimen of the type series, although Waterhouse described the species from specimens collected by Morrison in northern Sonora, Mexico. There is some doubt about the locality of the material collected by Morrison and labeled northern Sonora, as most of his material was collected in southern Arizona, and it is doubtful if he made any collections in Mexico.

Female.—Differing from the male in having the last visible sternite shallowly emarginate or transversely sinuate at apex, the eighth tergite coarsely, confluently punctured, broadly rounded at apex, longitudinally carinate, and more or less depressed on each side of carina, and the anterior tibia unarmed at apex.

Type locality.—Northern Sonora, Mexico. Type in the British Museum.

DISTRIBUTION

From material examined:

ARIZONA: No definite locality (H. K. Morrison). Catalina Springs, April 12–20; Catalina Mountains, May 16; Tucson, reared (Hubbard and Schwarz). Sabino Canyon, March to April, reared (G. Hofer, W. D. Edmonston, and F. C. Craighead). Florence, June 19 (C. R. Biedermann). Nogales, June 9, 1933, intercepted on hennequin fiber from Mexico. Carr Canyon, Huachuca Mountains. Globe, May 12, 1934 (F. H. Parker).
MEXICO: Northern Sonora (H. K. Morrison).
NEW MEXICO: Las Cruces (H. F. Wickham).
TEXAS: El Paso, April 5, 1902; Ysleta, April 3, 1902. Van Horn, May 23, 1932 (E. G. Linsley).

Chamberlin (1926) gives the distribution and type locality as Texas, which is incorrect, as it was described from northern Sonora, Mexico.

Hosts.—This species has been reared from mesquite (*Prosopis juliflora* (Swartz) De Candolle) collected at Catalina Springs and Sabino Canyon, Ariz., by G. Hofer and Hubbard and Schwarz, and from *Vauquelinia californica* (Torrey) Sargent, collected at Sabino Canyon by G. Hofer.

The color and sculpture are rather constant, but in a few cases the sides of the pronotum are yellowish instead of reddish cupreous. The clypeus is either deeply angularly or semicircularly emarginate in front and in the males is usually greenish, but occasionally specimens are found in which it is reddish cupreous like the rest of the surface. The front of the head in the females varies in color from

bronzy brown to brownish cupreous. The sides of the pronotum are usually strongly converging from near the apex to the base, but occasionally specimens are found with the pronotum widest at the middle and the sides arcuately rounded. The punctures on the pronotum are variable in size, but are separated from one another by at least their own diameter. In the females the apex of the last visible abdominal sternite has two margins (as in the males), but the upper margin is usually transversely sinuate and the lower one slightly more arcuate and strongly serrate. The length is from 6 to 9.5 mm.

This species is closely allied to *debilis* and *prosopidis*, but it differs from both these species in having the sides of the pronotum reddish cupreous. It also differs from *debilis* in having the greenish- or bluish-black markings on the elytra absent and the abdominal sternites without smooth lateral callosities. The male genitalia of *lateralis* and *debilis* are similar, but in *lateralis* the dilation at the apex of the anterior tibia is a little more strongly developed than in *debilis*. Horn (1886) placed *lateralis* as a synonym of *debilis* but it seems to be a valid species.

(40) Chrysobothris carmelita Fall

(Fig. 40; fig. 116, *D*)

Chrysobothris carmelita Fall, 1907, Canad. Ent. 39: 236–237; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 142; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 614.

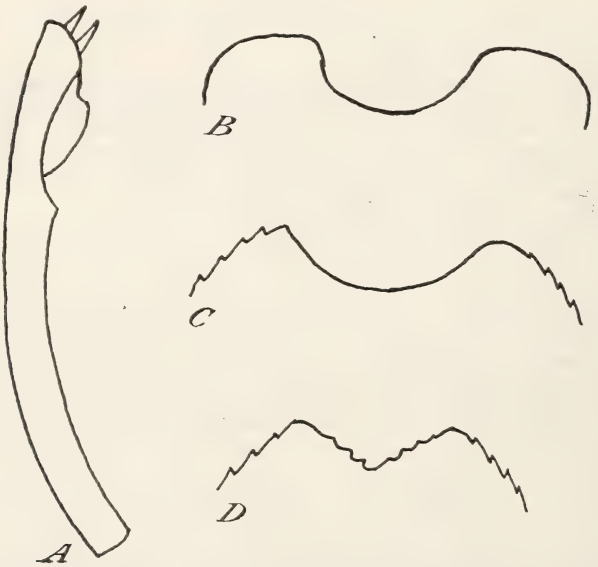

Figure 40.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris carmelita*.

Male.—Moderately elongate, slightly convex above, moderately shining; head green in front, becoming aureo-cupreous on occiput; pronotum purplish black at middle, with anterior margin and sides anteriorly purplish red; elytra bronzy brown, with a faint greenish reflection, costa bluish black and discal foveae

reddish cupreous; beneath black, with greenish and purplish reflections in different lights, and with posterior femora more or less reddish cupreous.

Head with a smooth longitudinal carina on occiput; front nearly flat; surface coarsely, confluently punctate, densely granulose, densely clothed on front with long, recumbent, white hairs; clypeus semicircularly emarginate in front, subtruncate on each side. Antenna bright reddish cupreous, paler toward outer margins of segments, slightly narrowed to apex; intermediate segments transverse, broadly truncate at outer margins; third segment nearly as long as following two segments united.

Pronotum one and one-half times as wide as long, distinctly narrower at base than at apex, widest near apex; sides arcuately rounded at apex, then strongly obliquely converging to posterior angles (slightly sinuate at middle); anterior margin strongly sinuate, with a distinct, broadly rounded, median lobe; base broadly, arcuately emarginate on each side, median lobe strongly produced, and narrowly rounded in front of scutellum; disk slightly convex, with a vague depression on each side of middle near base, but without distinct depressions or callosities; surface glabrous, coarsely, deeply, confluently ocellate-punctate, becoming transversely rugose toward sides.

Elytra at base distinctly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are conjointly broadly rounded; lateral margins coarsely serrate; basal depressions broad and moderately deep; humeral depressions elongate and shallow; surface glabrous, slightly uneven, coarsely, deeply, densely, uniformly punctate, more or less scabrous at base, intervals nearly smooth. Each elytron with three more or less distinct longitudinal costae; first distinct on apical half, smooth, parallel with sutural margin, and sinuate near apex; second shorter, indistinct, extending backward from antemedian fovea; third barely indicated, following outline of lateral margin; and with three shallow, rounded, cupreous foveae, one in front of middle and two at apical third.

Abdomen beneath sparsely, coarsely punctate, smooth along anterior and posterior margins of sternites, rather densely clothed with long, recumbent, whitish hairs, especially toward sides, without smooth lateral callosities, intervals vaguely granulose; last visible sternite broadly, semicircularly emarginate at apex, without a submarginal ridge, lateral margins distinctly serrate on apical halves; eighth tergite densely granulose, coarsely, sparsely punctate, lower margin broadly rounded, upper margin coarsely dentate and broadly, arcuately emarginate at apex, but not longitudinally carinate. Prosternum coarsely, confluently punctate, more or less transversely rugose, densely clothed with long, recumbent, white hairs; anterior margin with a distinct, broad, rather long, median lobe. Anterior femur with a large, rather acute tooth, which is coarsely dentate on outer margin. Anterior tibia strongly arcuate, with a broadly rounded, notched dilation at apex, with inner margin of tibia distinctly notched behind dilation; middle and posterior tibiae nearly straight, the former muricate at apex.

Length 7.5 mm., width 3 mm.

Redescribed from the male type in the collection of H. C. Fall.

Female.—Differing from the male in having the front of the head uniformly reddish cupreous, and more coarsely punctured and sparsely pubescent, the antenna piceous, with a faint cupreous tinge, the last visible sternite more elongate, and angularly emarginate at apex, the eighth tergite broadly rounded at apex and longitudinally carinate, and the anterior tibia unarmed at apex.

Type locality.—"Arizona," no definite locality.

DISTRIBUTION

From material examined:

ARIZONA: No definite locality. Hot Springs, June 24–26 (Barber and Schwarz). Santa Catalina Mountains, May 10, 1913 (M. Chrisman).

CALIFORNIA: 23 miles south of Vidal, Riverside County, June 12, 1940 (W. F. Barr).

Hosts.—The larval habits are unknown, but the adults have been collected on catclaw (*Acacia* sp.) in Arizona by M. Chrisman.

The color on the middle of the pronotum varies from purplish brown to greenish black. Sometimes there are two small callosities on the front of the head. The longitudinal costae on the elytra are sometimes purplish brown like the rest of the surface, and the foveae on the elytra are more distinct on some of the specimens. In well preserved specimens the white pubescence on the under side of the body is made more conspicuous by the presence of white efflorescence. The length is from 7.25 to 8.5 mm.

Fall described the species from two specimens, one collected at Hot Springs by Barber and Schwarz, the other specimen marked "Ariz.," without any definite locality, which he selected as the type.

(41) Chrysobothris piuta Wickham

(Fig. 41; fig. 116, *E*)

Chrysobothris piuta Wickham, 1903, Canad. Ent. 35: 67–69; Fall, 1907, Canad. Ent. 39: 238; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 165; Van Dyke, 1934, Ent. News 45: 66; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 645; Chamberlin, 1938, Pan-Pacific Ent. 14: 14; Knull, 1938, Soc. Ent. Amer. Ann. 31: 138, pl. 1, fig. 6.

Figure 41.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris piuta*.

Male.—Oblong, moderately convex above, rather strongly shining; pronotum purplish red anteriorly, bluish toward base; elytra bluish black on basal halves, except sutural margins, a short, narrow vitta toward lateral margins, and the depressed foveae (which are coppery or greenish brown), and coppery brown with purplish or greenish reflections in different lights on apical halves; beneath purplish brown, with a faint bronzy-green tinge.

Head bronzy green in front, becoming coppery yellow on occiput, with a smooth longitudinal carina on occiput, and an indistinct chevron on vertex separating the coppery and greenish areas; front slightly convex; surface finely, densely granulose, coarsely, densely, deeply, uniformly punctate, rather densely clothed with long, semierect, whitish hairs; clypeus broadly, triangularly emarginate in front, obtusely rounded on each side. Antenna uniformly bronzy brown, slightly narrowed to apex; intermediate segments not strongly compact, wider than long, broadly rounded at outer margins; third segment nearly as long as following two segments united.

Pronotum one and one-half times as wide as long, slightly wider at apex than at base, widest near apex; sides nearly parallel anteriorly, strongly constricted at posterior angles; anterior margin slightly sinuate, with a broadly rounded median lobe; base broadly, arcuately emarginate on each side, median lobe moderately produced, and truncate in front of scutellum; disk uniformly convex, without depressions or callosities, but with an indistinct, smooth, longitudinal, median spot on basal half; surface finely, densely granulose, densely, deeply punctate on median part, more coarsely, confluently punctate toward sides, sparsely clothed with whitish hairs near posterior angles.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins rather coarsely serrate posteriorly; basal depressions broad and deep; humeral depressions elongate and shallow; surface uneven, without distinct pubescence, coarsely, densely, deeply punctate, becoming confluently punctate and more or less scabrous at sides and toward apices; each elytron with a rather deep, transversely oval depression in front of middle, and a rounded, shallow depression just behind middle near lateral margin, but without distinct longitudinal costae.

Abdomen beneath finely, irregularly punctate on median parts, more densely punctate toward sides, smooth along anterior and posterior margins of sternites, sparsely, irregularly clothed with moderately long, recumbent, whitish hairs, without smooth lateral callosities, intervals finely granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins slightly, irregularly serrate; eighth tergite deeply, triangularly emarginate at apex, densely granulose, coarsely, densely punctate, but not longitudinally carinate. Prosternum coarsely, densely rugose, confluently punctate, rather densely clothed with long, recumbent, white hairs; anterior margin with a distinct, large, narrow, median lobe. Anterior femur with a short, obtuse tooth, which is dentate on outer margin. Anterior and middle tibiae slightly arcuate, the former armed with a small, rounded dilation near apex; posterior tibia straight.

Length 6.75 mm., width 2.75 mm.

Female.—Differing from the male in having the head uniformly coppery red and more sparsely pubescent, the prosternum more sparsely pubescent, the last visible sternite more shallowly emarginate at apex, the eighth tergite rounded at apex and longitudinally carinate, the middle tibia straight, and the anterior tibia unarmed near apex.

Redescribed from the male type and female allotype, No. 51938, in the United States National Museum.

Type locality.—Independence, Owens Valley, Calif.

DISTRIBUTION

From material examined:

ARIZONA: Williams, May to July (Barber and Schwarz); July 29 (H. F. Wickham). Ash Fork, June 18; Bright Angel, July 10 (Barber and Schwarz).
CALIFORNIA: Independence, Owens Valley, July 17; types (H. F. Wickham). Sunset Valley, Santa Barbara County, July 4, 1939 (W. F. Barr and M. Cazier).
NEVADA: Reno, July 18 (H. F. Wickham).

Hosts.—The larval habits are unknown, but the adults were collected by Wickham in California by beating desert shrubs, and by Barber and Schwarz in Arizona on antelope brush (*Purshia tridentata* (Pursh) DC).

Some specimens are more coppery red than others, and the color of the foveae on the elytra varies from coppery to green. The sides of the pronotum are rounded in some of the specimens. The apex of the last visible abdominal segment of the female is slightly variable in shape. The length is from 5.5 to 7.75 mm.

(42) Chrysobothris axillaris Horn

(Fig. 42; fig. 116, *F*)

Chrysobothris axillaris Horn, 1886, Amer. Ent. Soc. Trans. 13: 72, 75–76, pl. 2, figs. 20–24; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 207; Burke, 1918, Jour. Econ. Ent. 11: 210; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 139; Van Dyke, 1934, Ent. News 45: 66; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 611; Knull, 1936, Ent. News 47: 106.

Figure 42.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris axillaris*.

Female.—Broadly elongate, moderately convex above, subopaque, black, with a slight bronzy-brown tinge, basal depression and a large humeral space on each elytron bright reddish cupreous; beneath bluish black, more strongly shining than above, and anterior tibiae more or less reddish cupreous.

Head black, with two small, round callosities on front, and a broad, smooth, longitudinal carina on occiput, carina bifurcate on vertex; front nearly flat; surface coarsely, densely, uniformly fossulate-punctate, sparsely clothed with short, recumbent, whitish hairs, intervals densely granulose; clypeus broadly, deeply, arcuately emarginate in front, strongly, arcuately rounded on each side. Antenna piceous, gradually narrowed to apex; intermediate segments subtriangular, rather compact, slightly wider than long, broadly rounded at outer margins; third segment nearly as long as following two segments united.

Pronotum twice as wide as long, subequal in width at base and apex, widest near apex; sides strongly, arcuately rounded at apex, arcuately converging from near apex to base; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base angularly emarginate on each side, median lobe slightly produced, and subtruncate in front of scutellum; disk moderately convex, without depressions or callosities; surface finely, rather sparsely, uniformly punctate at middle, more densely punctate and slightly rugose at sides, intervals finely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions obsolete; surface glabrous, densely, uniformly, finely punctate, more or less scabrous toward base and at sides, intervals densely granulose, without discal foveae, but with first costa vaguely indicated on apical half of each elytron.

Abdomen beneath densely, coarsely punctate, and densely clothed with long, recumbent, white hairs, smooth along anterior and posterior margins of sternites, without lateral callosities, intervals densely granulose; last visible sternite broadly, shallowly, arcuately emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite broadly rounded at apex, coarsely, confluently punctate, and vaguely, longitudinally carinate. Prosternum flat, coarsely, confluently punctate, sparsely clothed with moderately long, recumbent, white hairs; anterior margin truncate, strongly deflexed, with a distinct, large, broad, median lobe. Anterior femur with a large, obtuse tooth, which is dentate on outer margin. Anterior tibia slightly arcuate; middle and posterior tibiae straight.

Length 8 mm., width 3.5 mm.

Redescribed from the female lectotype, No. 3429, in the Academy of Natural Sciences of Philadelphia.

Male.—Differing from the female in having the front of the head bronzy green, and more densely, finely punctured, the antenna uniformly bronzy green, the last visible sternite shorter, and slightly more broadly emarginate at apex, the eighth tergite more finely, sparsely punctured, the anterior tibia with a slight dilation at apex, and the middle tibia slightly arcuate.

Type locality.—Southern Arizona, no definite locality.

DISTRIBUTION

From material examined:

ARIZONA: Williams, May–July (Barber and Schwarz). Oracle, July (Hubbard and Schwarz). Flagstaff, July (H. F. Wickham). Palmerlee, Cochise County, June 21 (C. Schaeffer). Miller's Canyon, Huachuca Mountains, July 6, 1907 (H. A. Kaeber). Bear Canyon, Santa Catalina Mountains (M. Chrisman).

It has been recorded in the literature from Texas by different writers, but these records probably refer to *acaciae* Knull.

Hosts.—Adults have been reared from white oak (*Quercus arizonica* Sargent) collected by M. Chrisman in Arizona. Burke (1918) records the species as mining the bark and sapwood of dying and dead limbs of Emory oak (*Quercus emoryi* Torrey) in Arizona, and Knull (1933) also records it as breeding in the branches of oak (*Quercus* sp.) in the Huachuca Mountains of Arizona. The adults have been collected on Rocky Mountain white oak (*Quercus utahensis* (De Candolle) Rydberg—synonym *Quercus gambelii* Nuttall) in Arizona by Barber and Schwarz.

The sculpture on the dorsal surface of the body is rather uniform, but the color is somewhat variable, with the humeral spots on the elytra ranging from bright red to reddish yellow. The pronotum is usually widest near the apex, with the sides arcuately converging posteriorly, rarely with the pronotum arcuately rounded at the middle. The specimens from Palmerlee and the Huachuca Mountains have the clypeus more deeply, angularly emarginate in front, with the pubescence on the front of the head longer, and the front of the head brownish cupreous in the males. The length is from 6.5 to 8.5 mm.

Horn (1886) described the species from a single female from southern Arizona, but he mentions two other specimens from Texas, which were a little more brilliantly colored than the type. The writer found one of these specimens, which was labeled "paratype 3429,"in the Horn collection. This specimen is not *axillaris*, but the species recently described by Knull as *acaciae*.

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(43) CHRYSOBOTHRIS ACACIAE Knull

(Fig. 43; fig. 117, *A*)

Chrysobothris acaciae Knull, 1936, Ent. News 47: 105–106.

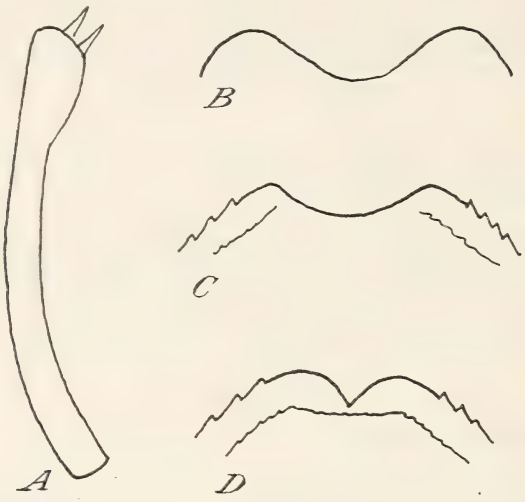

FIGURE 43.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris acaciae*.

Male.—Broadly elongate, moderately convex above, subopaque, bronzy brown, with a faint greenish tinge, anterior median part of pronotum and humeral spaces on each elytron bright coppery red; beneath piceous, with a distinct bluish and greenish tinge, and prosternum slightly cupreous.

Head bronzy green in front, becoming coppery red on vertex and occiput, with two smooth callosities on front, a vague, longitudinal carina on occiput, and an obscure chevron on vertex; front flat; surface coarsely, densely punctate, rugose behind clypeus, densely clothed with long, recumbent, white hairs, intervals densely granulose; clypeus deeply, arcuately emarginate in front, arcuately rounded on each side. Antenna uniformly reddish cupreous, slightly narrowed to apex; intermediate segments compact, wider than long, subtruncate at outer margins; third segment slightly longer than fourth.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest at apical fourth; sides strongly, arcuately converging toward apical angles, strongly, obliquely converging from apical fourth to posterior angles; anterior margin slightly sinuate, with a broadly rounded median lobe; base deeply, arcuately emarginate on each side, median lobe rather strongly produced and broadly rounded; disk moderately convex, without depressions or callosities; surface sparsely, coarsely punctate at middle, more densely punctate and rugose toward sides, with a vague, smooth, median line extending from scutellum to middle, the intervals finely, densely granulose.

Elytra distinctly wider than pronotum, widest behind middle; sides parallel anteriorly, broadly dilated behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins finely serrate posteriorly; basal depressions broad and deep; humeral depressions broad and moderately deep; surface glabrous, densely, finely punctate, the intervals densely granulose, and each elytron with four indistinct, longitudinal costae.

Abdomen beneath densely, finely punctate, densely clothed with long, recumbent, white hairs, smooth along anterior and posterior margins of sternites, without lateral callosities, intervals obsoletely granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, with a slightly elevated, serrate, submarginal ridge, lateral margins finely serrate; eighth tergite feebly notched at apex, densely granulose, densely, coarsely punctate, but not longitudinally carinate. Prosternum flat, coarsely, confluently punctate, transversely rugose an-

teriorly, sparsely clothed with long, semierect, white hairs; anterior margin with a large, broad, median lobe. Anterior femur with a large, moderately acute tooth, which is dentate on outer margin. Anterior tibia arcuate, with a slight dilation at apex; middle and posterior tibiae straight.

Length 6.5 mm., width 2.75 mm.

Female.—Differing from the male in having the front of the head more sparsely punctured, the antenna bronzy brown, the last visible sternite more narrowly emarginate at apex, the eighth tergite rounded at apex and longitudinally carinate, and the anterior tibia unarmed at apex.

Redescribed from the male holotype and female allotype in the collection of J. N. Knull.

Type locality.—Davis Mountains, Tex.

DISTRIBUTION

From material examined:

TEXAS: The only specimens examined are from the type series collected from May 25 to June 13, 1935, by J. N. Knull, and a female from Texas (without a definite locality) in the Academy of Natural Sciences of Philadelphia, under *axillaris*, labeled paratype No. 3429.

Host.—The larval habits of this species are unknown, but the adults have been collected in Texas by Knull on the branches of dying cat's-claw (*Acacia constricta* Benth.), which may be its host plant.

No variation worthy of mention was observed in the specimens examined, except in size, the range in length being from 6.5 to 7.5 mm.

This species is closely allied to *axillaris*, but it differs from that species in having a large coppery-red spot on the head and pronotum, and the anterior tibiae coppery red.

(44) CHRYSOBOTHRIS PURPUREOPLAGIATA Schaeffer

(Fig. 44; fig. 117, *B*)

Chrysobothris purpureoplagiata Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 206–207; 1905, Brooklyn Inst. Arts and Sci., Mus., Sci. Bul. 1: 130; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 167; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 646.

FIGURE 44.—Anterior tibia of male (A), clypeus (B), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris purpureoplagiata*.

Male.—Elongate, rather strongly depressed above, subopaque, bronzy green; each elytron with a broad, longitudinal, purplish-black, median vitta extending from middle to apex, connected posteriorly to sutural margin and to a narrow vitta along lateral margin, and with a small, round spot of the same color at basal fourth; beneath bluish to greenish black, with the legs slightly bronzy green.

Head uniformly bronzy green, with a more or less conspicuous, coppery-red chevron on vertex; front nearly flat; surface rather coarsely, densely punctate, longitudinally rugose on occiput, transversely rugose behind clypeus, sparsely clothed with long, recumbent, whitish hairs, intervals finely, densely granulose; clypeus semicircularly emarginate in front, broadly rounded on each side. Antenna piceous, with a distinct cupreous tinge, gradually narrowed to apex; intermediate segments compact, twice as wide as long, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum three-fifths wider than long, subequal in width at base and apex, widest along middle; sides nearly parallel along middle, arcuately converging toward base and apex; anterior margin slightly sinuate, with a broadly rounded median lobe; base broadly, arcuately emarginate on each side, median lobe moderately produced and broadly rounded; disk uniformly convex, without depressions or callosities; surface rather densely, coarsely, uniformly punctate at middle, more densely punctate at sides, intervals finely, densely granulose.

Elytra at base slightly wider than pronotum, nearly twice as long as wide, widest at apical third; sides slightly diverging from humeral angles to apical third, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate posteriorly; basal depressions broad and rather deep; humeral depressions elongate and shallow; surface glabrous, finely, densely granulose, densely, coarsely, uniformly punctate basally, the punctures becoming obsolete toward apices; each elytron with an indistinct median fovea in front of middle, and an indistinct, longitudinal costa posteriorly along lateral margin.

Abdomen beneath coarsely, sparsely punctate, sparsely clothed with short, recumbent, inconspicuous hairs, without lateral callosities, intervals vaguely granulose; last visible sternite broadly, arcuately emarginate at apex, without a distinct submarginal ridge, lateral margins slightly serrate; eighth tergite (missing in type). Prosternum coarsely, rather densely punctate, more or less rugose, sparsely clothed with long, erect, whitish hairs; anterior margin with a distinct, broad, moderately long, median lobe. Anterior femur with a large, acute tooth, which is coarsely dentate on outer margin. Anterior tibia slightly arcuate, with an elongate dilation at apex; middle and posterior tibiae straight.

Length 6 mm., width 2.25 mm.

Redescribed from the male lectotype, No. 42636, in the United States National Museum (present lectotype designation).

Female.—The two sexes are very much alike, but the female differs from the male in having the last visible sternite broadly, transversely sinuate at apex, the eighth tergite broadly rounded at the apex and more densely punctured, the prosternum more sparsely punctured, and the anterior tibia unarmed at the apex.

Type locality.—Florence, Ariz.

DISTRIBUTION

From material examined:

ARIZONA: Cotton City, reared (G. Hofer). Florence, type series (G. Franck). Santa Catalina Mountains, reared (M. Chrisman).

LOWER CALIFORNIA: El Taste, San Felipe, and Santa Rosa, August 1901 (G. Beyer).

Hosts.—Adults have been reared from larvae cut from "greasewood" collected in Arizona by M. Chrisman, and from larvae found between the bark and wood, and the heartwood of dead branches of *Canotia* sp. collected at the edge of the desert near Cotton City, Ariz., by G. Hofer.

This species varies in coloration from bronzy green to purplish black, the head uniformly bronzy green to reddish cupreous with only the occiput bronzy green, and the legs from bluish black to reddish cupreous or bronzy green. The purplish-black vittae on the elytra are often reduced to a narrow, elongate spot behind the middle, and the vittae becoming indistinct on the purplish-black specimens. The sides of the pronotum are usually rounded, parallel or sinuate at the middle, but occasionally a specimen has the pronotum widest near the apex, with the sides obliquely converging posteriorly. The intermediate segments of the antenna are sometimes not quite twice as wide as long. The eighth tergite of the male type is missing, but in other male specimens it is densely granulose, sparsely, coarsely punctate, and coarsely dentate and slightly emarginate at the apex. The length is from 6 to 7.5 mm.

(45) Chrysobothris purpureovittata Horn

(Fig. 45; fig. 117, *C*)

Chrysobothris purpureovittata Horn, 1886, Amer. Ent. Soc. Trans. 13: 72, 76–77, pl. 2, figs. 25–29; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 218; Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 328; Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 206–207; Blatchley, 1910, Coleoptera of Indiana, pp. 788, 789; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 167; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 646.

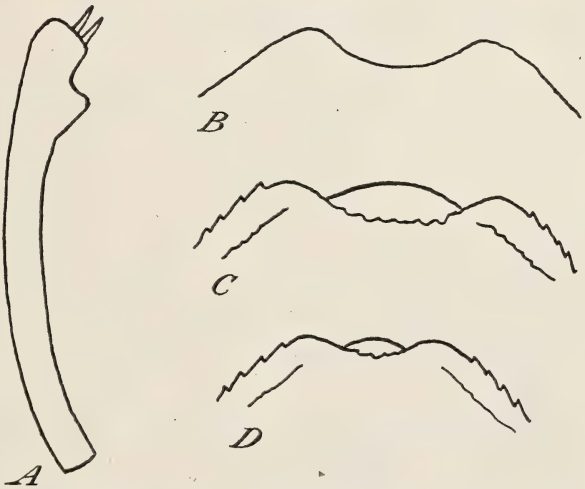

Figure 45.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris purpureovittata*.

Male.—Moderately elongate, moderately convex above, rather strongly shining, bronzy green, with a faint violaceous tinge, and each elytron ornamented with a broad, sinuate, purplish-black vitta extending from base to near tip; beneath bronzy green, with a distinct cupreous or purplish tinge, and more strongly shining than above.

Head bronzy green in front, becoming reddish cupreous on occiput, with a very narrow longitudinal carina on occiput and a vague chevron on vertex; front slightly convex; surface sparsely, coarsely, shallowly punctate, sparsely clothed with short, inconspicuous hairs, intervals densely granulose; clypeus rather deeply, broadly, arcuately emarginate in front, broadly rounded on each

side. Antenna piceous, slightly narrowed to apex; intermediate segments rather compact, slightly wider than long, subtruncate at outer margins; third segment slightly longer than fourth.

Pronotum one-half wider than long, subequal in width at base and apex, widest along middle; sides nearly parallel, slightly converging posteriorly; anterior margin subtruncate, with a broadly rounded, median lobe; base broadly, arcuately emarginate on each side, median lobe moderately produced and broadly rounded; disk moderately convex, without depressions or callosities; surface finely, transversely rugose, finely punctate between rugae, and finely, densely granulose.

Elytra slightly wider than pronotum, twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and moderately deep; humeral depressions elongate and shallow; disk uniformly convex, without costae or discal foveae; surface glabrous, finely, uniformly, but not very densely punctate, intervals densely, finely granulose.

Abdomen beneath sparsely, coarsely fossulate-punctate, sparsely clothed with short, recumbent, inconspicuous hairs, without lateral callosities, intervals densely granulose; last visible sternite strongly, transversely sinuate at apex, with an obsolete, submarginal ridge, lateral margins coarsely serrate; eighth tergite coarsely, sparsely punctate, vaguely emarginate at apex. Prosternum sparsely, coarsely punctate, more or less rugose, sparsely clothed with moderately long, erect, white hairs; anterior margin slightly rounded, with a distinct, broad, rather long, median lobe. Anterior femur with a large, very acute tooth, which is coarsely dentate on outer margin. Anterior tibia slightly arcuate, with a small triangular tooth at apical fourth; middle and posterior tibiae straight.

Length 7 mm., width 2.5 mm.

Redescribed from the male lectotype, No. 3430, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the front of the head uniformly bronzy green, reddish cupreous, or purplish black, and the anterior tibia unarmed near apex.

Type locality.—Texas, no definite locality.

DISTRIBUTION

From material examined:

ILLINOIS: No definite locality. Bluff Springs, June 10, 1932 (Roef and Mohr).
INDIANA: No definite locality.
KANSAS: Belvidere, June-July (H. F. Wickham and W. Knaus). Clark County, June (E. Smyth). Riley County, reared (P. J. Parrott).
LOUISIANA: Bossier Parish, May 10, 1938 (W. F. Turner).
OKLAHOMA: South McAlester, June 11 (H. F. Wickham). Kingfisher, July 20 (J. C. Warren).
TEXAS: No definite locality (Belfrage). Alpine, June 28–30, 4,400–6,000 feet; Del Rio, June 22–27, 955 feet (H. F. Wickham). San Antonio, June 22 (H. Soltau). Dallas; New Braunfels, June 27 (Hubbard and Schwarz). Brownsville, May (C. Schaeffer). Sabinal, May 26, 1910 (F. C. Pratt). Davis Mountains, July 9 (H. A. Kaeber). Longfellow, July 1, 1930 (E. G. Linsley).

Horn (1894) and Chamberlin (1926) record the species from various localities in Lower California, but these records probably refer to the specimens of *purpureoplagiata* collected by G. Beyer.

Host.—Adults have been reared from elm and plum twigs collected in Kansas by P. J. Parrott.

The color varies from green or blue to violaceous black or bronzy cupreous. The purplish-black vitta on each elytron in some specimens does not extend to the apex or base and is frequently connected posteriorly to a vitta of the same color along the lateral margin, but in the violaceous-black specimens the vitta is inconspicuous. In some specimens the surface of the head is longitudinally rugose on the occiput and transversely rugose behind the clypeus. Usually the sides of the pronotum converge from near the apex to the base, but in a few specimens examined the sides were parallel at the middle. The surface of the elytra is either uniformly punctured or coarsely, densely punctate and more or less rugose basally, but becoming more finely, sparsely punctured toward the apices. The eighth abdominal tergite of the male is usually rounded at the apex, but occasionally a specimen is found with a small triangular notch at the apex. The length is from 6 to 7.5 mm.

Horn (1886) described this species from Indiana, Illinois, Kansas, and Texas, but Chamberlin (1926) selected the Texas specimen as the lectotype.

This species resembles *purpureoplagiata*, but the clypeus is more shallowly emarginate in front, the purplish-black vittae on the elytra usually extend from the base to the apex, and the distribution of *purpureovittata* seems to be confined to the region east of the Rocky Mountains.

(46) Chrysobothris harrisi (Hentz)

(Fig. 46 ; fig. 117, *D*)

Buprestis harrisi Hentz, 1827, Acad. Nat. Sci. Phila. Jour. (1826) 5: 373–374, pl. 13, fig. 1; Harris, 1829, New England Farmer 8: No. 1, p. 2; 1833, *in* Hitchcock's Rpt. on Geol., etc., Mass., p. 570, 1835, ed. 2, p. 558.

Chrysobothris harrisi Harris, 1852, Insects Injurious to Vegetation, ed. 2, p. 44; Fitch, 1858, N. Y. State Agr. Soc. Trans. 17: 703; LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 239; Harris, 1862, Insects Injurious to Vegetation, Flint ed., p. 51, pl. 2, fig. 2; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, pp. 1425–1426; Hubbard and Schwarz, 1878, Amer. Phil. Soc. Proc. 17: 636; Harrington, 1879, Canad. Ent. 11: 119; Saunders, 1884, Ent. Soc. Ontario Ann. Rept. (1883) 14: 55; Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 86, pl. 3, figs. 66–70; Packard, 1890, U. S. Ent. Comn. Rpt. 5: 62, 680–681, fig. 220; Felt, 1906, N. Y. State Mus. Mem. 8: 467, 751; Nicolay, 1917, Brooklyn Ent. Soc. Bul. 12: 93; Frost, 1920, Canad. Ent. 52: 26; Knull, 1920, Ent. News 31: 7; 1922, Canad. Ent. 54: 83; 1925, Ohio State Univ. Studies 2 (2): 29–30, pl. 1, fig. 25; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 157; Leonard, 1928, N. Y. (Cornell) Agr. Expt. Sta. Mem. 101: 361; Chamberlin, 1934, Pan-Pacific Ent. 10: 40; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 635–636; Brimley, 1938, Insects of North Carolina, p. 172.

Chrysobothris chlorocephala Dejean, 1833, Cat. Coléopt., ed. 2, p. 80 and 1836, ed. 3, p. 90 (no description); Gory, 1840, Monog. Buprestides, sup. 4, p. 161, pl. 27, fig. 156; Packard, 1890, U. S. Ent. Comn. Rpt. 5: 69, fig. 19.

Chrysobothris chalcophoroides Smith (not Horn), 1887, Ent. Amer. 3: 39 (misidentification).

Trachypteris harrisii Melsheimer, 1853, Cat. Coleopt. U. S., p. 65.

The foregoing list of citations to the literature is not complete, only the more important ones being shown.

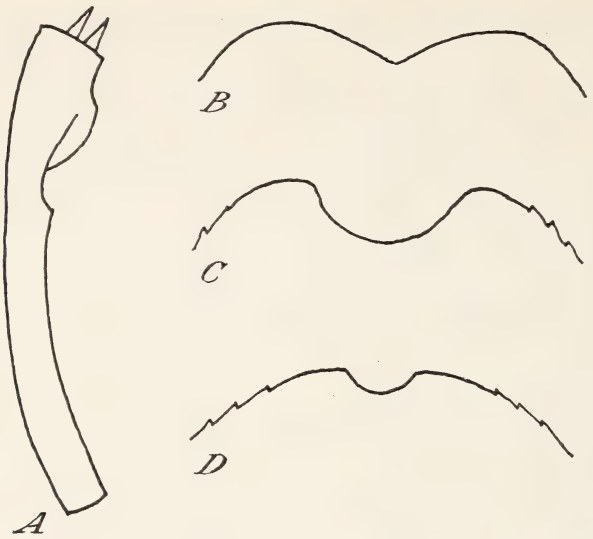

FIGURE 46.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (C) and of female (D) of *Chrysobothris harrisi*.

Male.—Broadly elongate, slightly convex above, rather strongly shining, bronzy green, slightly bluish, with the sides of the pronotum reddish cupreous; beneath bronzy green, more or less brownish to purplish cupreous, and more strongly shining than above; tarsi piceous.

Head reddish cupreous, with an obscure, narrow, longitudinal carina on occiput; front slightly convex; surface coarsely, rather densely, deeply punctate, sparsely clothed with moderately long, erect, inconspicuous hairs, intervals indistinctly granulose; clypeus deeply, broadly, triangularly emarginate in front, arcuately rounded on each side. Antenna bronzy brown, with a slight cupreous tinge, slightly narrowed to apex; intermediate segments subtriangular, moderately compact, slightly wider than long, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum nearly twice as wide as long, slightly wider at base than at apex, widest at middle; sides parallel and slightly sinuate at middle, arcuately converging anteriorly and posteriorly; posterior angles obtusely rounded; anterior margin arcuately emarginate, with a distinct, broadly rounded, median lobe; base broadly, arcuately emarginate on each side, median lobe strongly produced, and subtruncate in front of scutellum; disk moderately convex, slightly uneven, with a narrow, longitudinal, median depression, and a shallow, broad depression on each side near lateral margin; surface densely, coarsely, deeply, irregularly punctate, more or less transversely rugose at sides, intervals vaguely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal and humeral depressions broad, deep, and separated from each other by a narrow elevation; surface glabrous, slightly uneven, coarsely, densely, deeply punctate, intervals vaguely granulose. Each elytron with four more or less distinct longitudinal costae; first slightly elevated on apical half; second and third obsolete, broadly interrupted, and replaced on apical half by narrow, irregular, transverse, smooth spaces; fourth scarcely elevated, following outline of lateral margin; and with a vague depression between first and third costae at basal third.

Abdomen beneath rather densely, coarsely fossulate-punctate, sparsely clothed with short, recumbent, inconspicuous hairs, without lateral callosities, intervals

finely granulose; last visible sternite semicircularly emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite coarsely, sparsely punctate, broadly, deeply, angularly emarginate at apex, but not longitudinally carinate. Prosternum coarsely, densely punctate, more or less rugose anteriorly, rather densely clothed with long, semierect, white hairs; anterior margin slightly rounded, without a median lobe. Anterior femur with a large, obtuse tooth, which is dentate on outer margin. Anterior tibia slightly arcuate, with a rounded dilation near apex, and grooved and flattened behind the dilation; middle tibia slightly arcuate, and slightly flattened at apical fourth; posterior tibia straight. Length 8 mm., width 3.5 mm.

Redescribed from a male in the United States National Museum, collected on white pine at Stoughton, Mass., by Mrs. D. H. Blake.

Female.—Differing from the male in having the front of the head, the pronotum, and the underside of the body bluish green, the antenna bronzy green, the last visible sternite slightly notched at apex, the eighth tergite coarsely, densely punctured, and broadly rounded at apex, the prosternum sparsely pubescent, and the anterior tibia unarmed near apex.

Type locality.—Of *harrisi*, Massachusetts; of *chlorocephala*, "Amérique Boréale." Present location of types unknown to the writer.

Distribution.—Material has been examined from Ottawa and New Brunswick, Canada, the District of Columbia, and various localities in the following States: Maine, Maryland, Massachusetts, Michigan, New Hampshire, North Carolina, Pennsylvania, Rhode Island, South Carolina, and Virginia. It has also been recorded in the literature from Quebec, Canada, and Alabama, Connecticut, Florida, and Georgia.

Hosts.—Harris (1829) records the larvae as inhabiting the small limbs of northern white pine (*Pinus strobus* Linnaeus) and Knull (1920) reared the adults from small branches of Virginia pine (*Pinus virginiana* Miller) in Pennsylvania. Chamberlin (1926) records the host as pitch pine (*Pinus rigida* Miller). Manee (1913) records collecting the adults on common winterberry (*Ilex verticillata* (Linnaeus) Gray), but it is probably not the host plant for this species.

This species varies in color from light green to a dark violaceous blue, and the underside of the body (except abdomen) in some of the males is distinctly purplish red, with a distinct golden reflection. The clypeus is more shallowly emarginate in some specimens than in others, and in some examples there is an obsolete discal fovea at the apical third of the elytron, but this fovea is never distinct. In some examples the median sulcus on the pronotum is only slightly indicated, and the surface is rather deeply depressed near the lateral margins. The sides of the pronotum are usually sinuate, or more or less emarginate at the middle, but in a few specimens the pronotum is widest at the apical third, with the sides arcuately converging posteriorly. The tip of the last visible abdominal sternite in the female is either rounded or slightly notched. The length is from 6.5 to 9 mm.

Hentz described the species from a specimen collected during the month of May, but it is impossible to determine the sex from the description. The original spelling is "*harrissi*," which is a typographical error for *harrisi*.

(47) Chrysobothris chiricahuae Knull

(Fig. 47; fig. 117, *E*)

Chrysobothris chiricahuae Knull, 1937, Ent. News 48: 37–38.

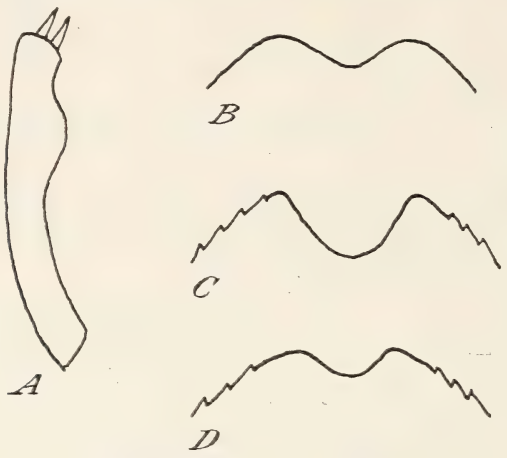

Figure 47.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris chiricahuae*.

Male.—Moderately elongate, strongly depressed above, rather strongly shining, bronzy brown, with a distinct cupreous tinge, pronotum more cupreous and more strongly shining than elytra; beneath brownish cupreous, with an indistinct bronzy reflection, and more strongly shining than elytra.

Head uniformly bronzy brown, with two small, irregular callosities on front and a smooth longitudinal carina on occiput; front slightly convex; surface coarsely, rather densely, irregularly punctate, sparsely clothed with long, recumbent, whitish hairs, intervals densely granulose; clypeus broadly, deeply, arcuately emarginate in front, transversely subtruncate on each side. Antenna piceous, with a distinct cupreous tinge, uniform in width to apex; intermediate segments compact, wider than long, subtruncate at outer margins; third segment one-third longer than fourth.

Pronotum twice as wide as long, narrower at apex than at base, widest just behind middle; sides nearly parallel at middle, arcuately converging toward base and apex; anterior margin slightly sinuate, with a vague median lobe; base broadly, arcuately emarginate on each side, median lobe strongly produced, and narrowly truncate in front of scutellum; disk with a faint, longitudinal, median depression, a deep lateral depression on each side near apical angle, and a small callosity on each side at base; surface coarsely, rather densely, irregularly punctate at middle, coarser and confluently punctate toward the sides, the intervals densely, finely granulose.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides feebly sinuate and nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately rather narrowly rounded; lateral margins finely serrate posteriorly; basal and humeral depressions broad and deep; disk uneven, rather strongly depressed; surface glabrous, finely, irregularly punctate. Each elytron with three smooth, longitudinal costae, the first straight, strongly elevated, extending along sutural margin from apex to basal third, and the other two irregular, interrupted by the densely punctured depressions, and with an irregular, transverse depression in front of middle, a smaller one behind middle, and two indistinct ones at apical third.

Abdomen beneath sparsely, finely, irregularly punctate, sparsely clothed with moderately long, recumbent, whitish hairs, without lateral callosities, intervals densely granulose; last visible sternite deeply, broadly, arcuately emarginate at apex, without a submarginal ridge, lateral margins slightly serrate; eighth tergite deeply, broadly, triangularly emarginate at apex, densely granulose,

coarsely, sparsely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, except on median part, sparsely clothed with long, recumbent, white hairs; anterior margin broadly, arcuately rounded. Anterior femur with a large, obtusely triangular tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae slightly arcuate, each with a rounded dilation at apical third; posterior tibia straight.

Length 11.5 mm., width 4.6 mm.

Female.—Differing from the male in having the front of the head more sparsely punctured, less densely pubescent, and the intervals nearly smooth, the last visible sternite more shallowly emarginate at apex, the prosternum more sparsely punctured and less densely pubescent, and the tibiae unarmed near apices.

Redescribed from the male holotype and female allotype in the collection of J. N. Knull.

Type locality.—Chiricahua Mountains, Ariz.

DISTRIBUTION

From material examined:

ARIZONA: Chiricahua Mountains, June 23, 1933, holotype (F. H. Parker); June 2, 1935, allotype (J. N. Knull).

Host.—The larval habits are unknown, but the allotype was collected on pine slash at an elevation of about 8,000 feet, and Mr. Knull believes that the species breeds in pine.

No variation worthy of mention was observed in the type series, except in size, the specimens examined ranging in length from 11.5 to 12.5 mm.

(48) CHRYSOBOTHRIS MICROMORPHA Fall

(Fig. 48; fig. 117, *F*)

Chrysobothris micromorpha Fall, 1907, Canad. Ent. 39: 237–238; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 163; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 642; Chamberlin, 1938, Pan-Pacific Ent. 14: 14.

FIGURE 48.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris micromorpha*.

Male.—Elongate, slightly convex above, moderately shining, dark bronzy brown, with a slight violaceous reflection; beneath piceous, with a faint bluish tinge, the tips of the middle femora, apical halves of posterior femora, and basal halves of posterior tibiae bright coppery red.

Head coppery red on occiput and vertex, becoming green on front, with a narrow, longitudinal groove on occiput, and on each side of front an oblique smooth spot, above which is a broad chevron; front slightly convex; surface coarsely, shallowly, irregularly punctate, more or less rugose behind clypeus, sparsely clothed with long, recumbent, white hairs, intervals densely, finely granulose; clypeus broadly, deeply, arcuately emarginate in front, broadly rounded on each side. Antenna uniformly piceous, with a faint cupreous tinge, slightly narrowed to apex; intermediate segments wider than long, subtriangular, broadly rounded at outer margins; third segment slightly longer than fourth.

Pronotum three-fourths wider than long, distinctly wider at apex than at base, widest near apex; sides slightly rounded at apex, strongly, arcuately converging from near apex to posterior angles; anterior margin moderately sinuate, with a broadly rounded median lobe; base deeply, arcuately emarginate on each side, median lobe strongly produced, and subtruncate in front of scutellum; disk uniformly convex, without depressions or callosities; surface glabrous, densely, deeply, uniformly punctate, punctures separated by about their own diameter, more or less rugose at sides, intervals finely, densely granulose.

Elytra at base distinctly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to apical third (slightly expanded behind middle), then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal depressions broad and moderately deep; humeral depressions very shallow; surface glabrous, slightly uneven, punctures similar to those on pronotum, without distinct discal foveae, but each elytron with a vague longitudinal costa on apical half near sutural margin.

Abdomen beneath coarsely, densely, deeply punctate, smooth along anterior and posterior margins of sternites, densely clothed with long, recumbent, white hairs except at middle, without lateral callosities, intervals densely granulose; last visible sternite broadly, shallowly, arcuately emarginate and coarsely dentate at apex, without a submarginal ridge, lateral margins slightly serrate; eighth tergite sparsely, coarsely punctate, densely granulose, not longitudinally carinate, lower margin broadly rounded at apex, upper margin deeply, narrowly, angularly emarginate at apex. Prosternum densely, coarsely punctate, sparsely clothed with moderately long, recumbent, white hairs, and with a distinct, broad, moderately long, median lobe in front. Anterior femur with a large, acute tooth, which is strongly dentate on outer margin. Anterior tibia slightly arcuate, with a small rounded dilation at apex; middle and posterior tibiae straight.

Length 5 mm., width 1.75 mm.

Redescribed from the male type in the collection of H. C. Fall.

Female.—The two sexes are very much alike, but the female differs from the male in having the last visible sternite longer and broadly rounded at the apex, the eighth tergite broadly rounded at the apex, and the anterior tibia nearly straight and unarmed at the apex.

Type locality.—Arizona, no definite locality.

DISTRIBUTION

From material examined:

ARIZONA: Hot Springs, June 24–28 (Barber and Schwarz).

Host.—Unknown.

No variation worthy of note has been observed in the small series of specimens examined except in length, which ranges from 4 to 6.5 mm. In well-preserved specimens the surface at the sides of the abdomen is nearly concealed by the white efflorescence.

Fall (1907) had two males before him when he described the species, one from Hot Springs, Ariz., and the other from Arizona

without a definite locality, but he selected the latter specimen as the type. Chamberlin (1926) gives the type locality as Hot Springs, and he also records a specimen in the United States National Museum collection from Oracle, Ariz., but this specimen is *parapiuta* Knull.

(49) Chrysobothris kelloggi Knull

(Fig. 49; fig. 118, *A*)

Chrysobothris kelloggi Knull, 1937, Ent. News 48: 36–37.

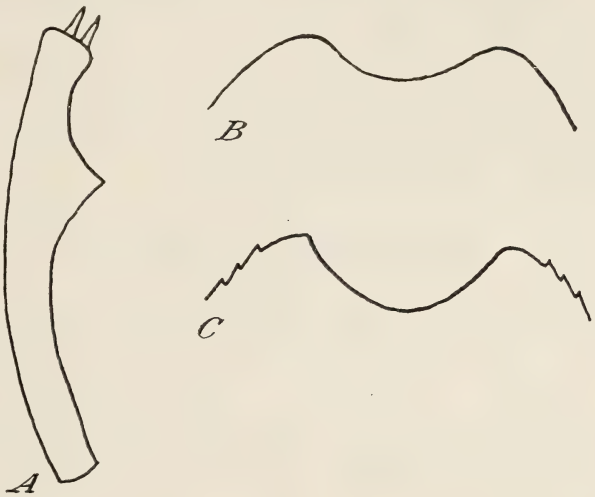

Figure 49.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of the male (*C*) of *Chrysobothris kelloggi*

Male.—Broadly elongate, strongly flattened above, moderately shining, purplish brown, with a vague cupreous reflection in different lights; beneath purplish, with a distinct bronzy-green tinge, and more strongly shining than above.

Head purplish brown, slightly bronzy green behind clypeus, with two smooth callosities near vertex, and a broad, smooth, longitudinal carina on occiput; front slightly convex; surface coarsely, confluently punctate, becoming rugose toward clypeus, densely clothed with long, recumbent, whitish hairs, intervals densely granulose; clypeus broadly, deeply, arcuately emarginate in front, arcuately rounded on each side. Antenna piceous, subequal in width to apex; intermediate segments compact, wider than long, broadly rounded at outer margins; third segment one and one-half times as long as fourth.

Pronotum more than twice as wide as long, slightly narrower at apex than at base, widest at middle; sides strongly, arcuately rounded; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base broadly, arcuately emarginate on each side, median lobe moderately produced, and narrowly rounded in front of scutellum; disk flat, with a broad depression on each side along lateral margin, and a vague, irregular, longitudinal depression on each side of middle line; surface sparsely, irregularly punctate at middle, becoming confluently punctate at sides, with two small, round, indistinct, smooth spots, and three longitudinal, smooth spaces extending from base to apex.

Elytra wider at base than pronotum, one and one-half times as long as wide, widest behind middle; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins rather coarsely serrate; basal depressions very deep; humeral depressions moderately deep; disk strongly flattened and uneven; surface without distinct pubescence, irregularly punctate on elevated areas, confluently foveolate-punctate in depressed areas, each elytron with a distinct,

smooth, longitudinal costa parallel to sutural margin, and with three irregular, transverse, smooth, elevated areas.

Abdomen beneath coarsely, irregularly fossulate-punctate, sparsely clothed with inconspicuous, recumbent hairs, without lateral callosities, intervals densely granulose; first two visible sternites deeply concave at middle; last visible sternite deeply, semicircularly emarginate at apex, without a submarginal ridge, lateral margins finely serrate; eighth tergite broadly, shallowly emarginate at apex, densely granulose, coarsely, densely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, densely clothed with long, recumbent, whitish hairs; anterior margin slightly rounded, but not distinctly lobed. Anterior femur with a large, acutely triangular tooth, which is dentate on outer margin. Anterior and middle tibiae arcuate, the former with a triangular tooth at apical third; posterior tibia straight.

Length 7 mm., width 3.5 mm.

Female.—Unknown.

Redescribed from the male holotype in the collection of J. N. Knull.

Type locality.—Silver City, N. Mex.

Distribution.—The only specimen seen was the unique holotype, collected January 28, 1934, by R. T. Kellogg.

Host.—Unknown.

(50) Chrysobothris parapiuta Knull

(Fig. 50; fig. 118, *B*)

Chrysobothris parapiuta Knull, 1938, Ent. Soc. Amer. Ann. 31: 138, pl. 1, fig. 5.

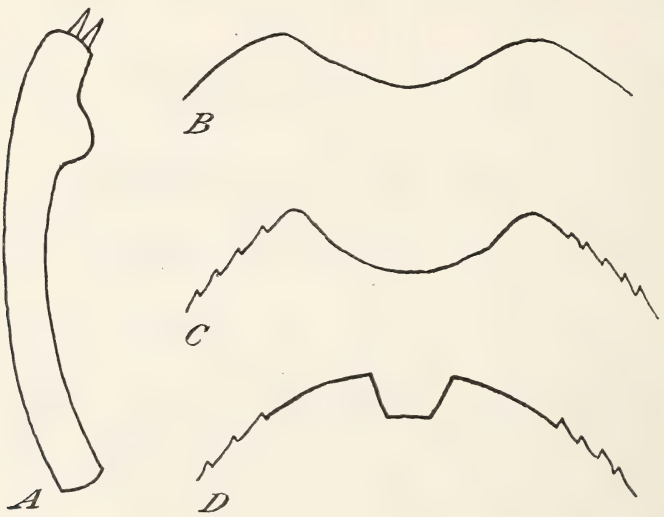

Figure 50.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris parapiuta*.

Male.—Oblong, moderately convex above, rather strongly shining; pronotum reddish cupreous anteriorly, bronzy black toward base; elytra bronzy or olivaceous green, with a distinct violaceous tinge; beneath bronzy brown, with a faint violaceous reflection.

Head bright green in front, becoming reddish cupreous on vertex and occiput, with two smooth callosities on front, and a narrow, longitudinal carina on occiput; front slightly convex, vaguely depressed below vertex; surface sparsely, coarsely punctate, more densely and vaguely rugose behind clypeus, sparsely clothed with long, recumbent, white hairs, intervals densely, finely granulose; clypeus broadly, deeply, arcuately emarginate in front, arcuately rounded on each

side. Antenna piceous, gradually narrowed to apex; intermediate segments moderately compact, wider than long, broadly rounded at outer margins; third segment as long as following two segments united

Pronotum nearly twice as wide as long, wider at apex than at base, widest near apex; sides slightly converging at apical angles, strongly converging from near apical angles to near posterior angles, where they are slightly constricted; anterior margin slightly sinuate, with a broadly rounded median lobe; base strongly, arcuately emarginate on each side, median lobe moderately produced and broadly rounded; disk rather strongly convex, without distinct depressions or callosities; surface coarsely, rather densely punctate, more or less rugose toward sides and along base, clothed at sides with a few inconspicuous hairs, intervals densely granulose.

Elytra distinctly wider than pronotum, twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins finely serrate posteriorly; basal depressions broad and deep; humeral depressions broad and shallow; disk moderately convex; surface glabrous, coarsely, densely, uniformly punctate, without distinct costae, intervals nearly smooth, and each elytron with a rather distinct fovea in front of middle and a very indistinct one behind middle near lateral margin.

Abdomen beneath coarsely, sparsely punctate, smooth along anterior and posterior margins of sternites, sparsely clothed with long, recumbent, white hairs, without lateral callosities, intervals finely granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, without a distinct submarginal ridge, lateral margins finely serrate; eighth tergite deeply, triangularly emarginate at apex, densely granulose, coarsely, densely punctate, but not longitudinally carinate. Prosterum coarsely, confluently punctate, sparsely clothed with long, recumbent, whitish hairs; anterior margin with a large, broad, median lobe. Anterior femur with an indistinct tooth. Anterior tibia slightly arcuate, with a rounded dilation at apical fourth; middle and posterior tibiae straight.

Length 5.5 mm., width 2.2 mm.

Female.—Differing from the male in having the front of the head uniformly reddish cupreous, the last visible sternite deeply, narrowly emarginate at apex, the eighth tergite broadly rounded at apex, confluently punctured, and longitudinally carinate, the prosternum indistinctly pubescent, and the anterior tibia unarmed at apex.

Redescribed from the male holotype and female allotype in the collection of J. N. Knull.

Type locality.—Wickenburg, Ariz.

DISTRIBUTION

From material examined:

ARIZONA: Wickenburg, June 18, 1937, type series (D. J. and J. N. Knull). Oracle, July 5–11 (Hubbard and Schwarz). Ashfork, June 18 (Barber and Schwarz).

Also recorded from:

ARIZONA: Prescott National Forest, July 29, 1937 (D. J. and J. N. Knull).

Host.—Unknown.

There is a slight variation in the small number of specimens examined. The color on the anterior half of the pronotum varies from reddish cupreous to golden green. The clypeus is either angularly or arcuately emarginate in front, and the foveae on the elytra are usually more bronzy green than the rest of the surface. Sometimes the sides of the pronotum are more strongly converging posteriorly than in other examples, in which case the pronotum is not constricted near the base. The length is from 4.5 to 6 mm.

(51) CHRYSOBOTHRIS FLORICOLA Gory

(Fig. 51; fig. 118, *C*)

Chrysobothris floricola Gory, 1840, Monog. Buprestides, sup., v. 4, pp. 179–180, pl. 30, fig. 175; LeConte, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 332; Hubbard and Schwarz, 1878, Amer. Phil. Soc. Proc. 17: 636; Harrington, 1884, Canad. Ent. 16: 71; Horn, 1886, Amer. Ent. Soc. Trans. 13: 80, 81–82, pl. 2, figs. 45–49; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 213; Evans, 1895, Canad. Ent. 27: 146; Felt, 1905–1906, N. Y. State Mus. Mem. 8, pp. 649, 658, pl. 20, fig. 10; Blatchley, 1910, Coleoptera of Indiana, pp. 788, 790; Manee, 1913, Ent. News 24: 170; Johnson, 1915, Ent. News 26: 312; Nicolay, 1919, Brooklyn Ent. Soc. Bul. 14: 19; Frost, 1920, Canad. Ent. 52: 28; Knull, 1922, Canad. Ent. 54: 83; 1925, Ohio State Univ. Studies 2 (2): 29, pl. 5, fig. 2; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 155–156; Leonard, 1928, N. Y. (Cornell) Agr. Expt. Sta. Mem. 101: 360; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 633–634; Brimley, 1938, Insects of North Carolina, p. 172.

Chrysobothris femorata Castelnau and Gory (not Olivier), 1837, Monog. Buprestides 2, *Chrysobothris*, pp. 48–49, pl. 9, fig. 65; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 213.

Chrysobothris calcarata Melsheimer, 1844, Acad. Nat. Sci. Phila. Proc. 2: 146–147; LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 234; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1424.

The list of citations to the literature is not complete, only the more important ones being listed.

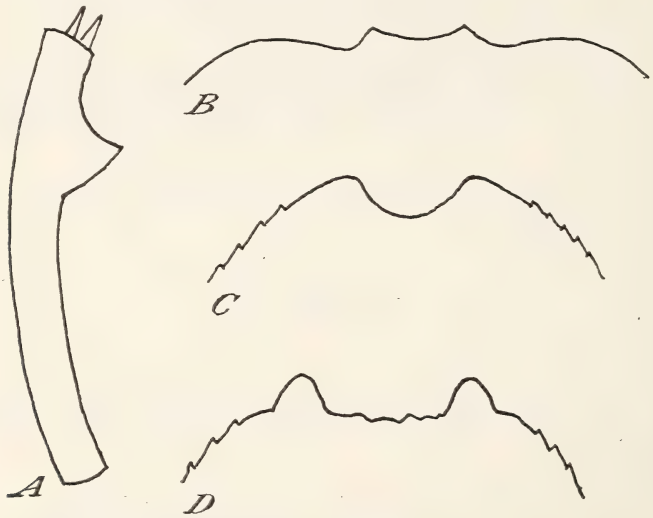

FIGURE 51.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris floricola*

Male.—Rather broadly elongate, slightly convex above, strongly shining, bronzy cupreous; beneath brownish cupreous, with a distinct purplish reflection, and the legs more or less greenish.

Head brownish cupreous, bronzy green behind clypeus and along lateral margins, with small, irregular, smooth callosities on front and a narrow, longitudinal, smooth carina on occiput; front nearly flat; surface coarsely, densely, irregularly punctate, sparsely clothed with rather long, semierect, fine hairs, intervals finely granulose; clypeus transversely sinuate in front, with a short, broad, subtruncate, median lobe. Antenna bronzy green, nearly equal in width to apex; intermediate segment subtriangular, slightly wider than long, broadly rounded at outer margins; third segment as long as following two segments united.

Pronotum nearly twice as wide as long, wider at base than at apex, widest along middle; sides sinuate and nearly parallel at middle, arcuately converging toward base and apex; anterior margin slightly, arcuately emarginate, without a distinct median lobe; base arcuately emarginate on each side, median lobe strongly produced and broadly rounded; disk slightly uneven, with a broad, longitudinal, median depression, a vague, rounded depression on each side near anterior margin, separated from median depression by a smooth, irregular callosity, and with a subcariniform callosity at base opposite middle of each elytron; surface coarsely, irregularly punctate, rather sparsely at middle, but more confluently at sides.

Elytra slightly wider than pronotum, about one and two-thirds times as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and very deep; humeral depressions broad and shallow; surface glabrous, coarsely, densely, deeply, irregularly punctate. Each elytron with four more or less distinct longitudinal costae; first distinct, moderately elevated from apex to near base, sinuate near apex; second and third irregular and broadly interrupted by foveae; fourth barely indicated, following outline of lateral margin; and with two transverse, irregular foveae between first and third costae, one in front of middle, the other near apical third.

Abdomen beneath rather sparsely, finely, irregularly punctate, more densely at sides, sparsely clothed at sides with short, recumbent, white hairs, without distinct lateral callosities, intervals vaguely granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite thickened at apex, dorsal margin transversely truncate at apex and projecting over ventral margin, which is arcuately elevated at middle when viewed from tip, surface coarsely, sparsely punctate, but not longitudinally carinate. Prosternum rather densely, coarsely punctate at sides, more sparsely punctate at middle, sparsely clothed with long, erect, white hairs; anterior margin feebly rounded, with a vague, broad, median lobe. Anterior femur with a large, acute tooth, which is dentate on outer margin. Anterior tibia slightly arcuate, with a large, acutely triangular tooth near apical third; middle tibia slightly arcuate, dilated at apex, with a small tooth at apical third; posterior tibia straight.

Length 13.5 mm., width 5.25 mm.

Redescribed from a male in the United States National Museum, collected in the Royal Palm Park, Fla., March 24, 1930, by J. C. Pallister.

Female.—Differing from the male in having the front of the head more strongly convex and more sparsely pubescent, the last visible sternite more elongate and broadly emarginate at apex, the emargination transverse and crenulate at bottom, the eighth tergite with the dorsal margin not projecting and the vertical margin scarcely elevated at middle, and the tibiae unarmed near apices.

Type locality.—Of *floricola*, "Amerique Boréale." Of *femorata* Castelnau and Gory (not Olivier), "Amerique Boréale." Of *calcarata*, Pennsylvania. Present location of these types unknown to the writer.

Distribution.—This species has a wide distribution over the eastern part of North America. Material has been examined from the District of Columbia and various localities in the following States: Alabama, Florida, Georgia, Illinois, Louisiana, Maryland, Massachusetts, Mississippi, Michigan, New Jersey, New York, North Carolina, Pennsylvania, South Carolina, Texas, Virginia, West Virginia, and Wisconsin. It has been recorded in the literature from the Provinces of Quebec and Ontario, Canada, and from Indiana and Connecticut. Kerremans (*in* Wytsman's Genera Insectorum, fasc. 12, pt. 3, 1903, p. 187) records it from California, but this is an error, as the species is not found west of the Rocky Mountains.

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Hosts.—The adults have been collected on pitch pine (*Pinus rigida* Miller), northern white pine (*Pinus strobus* Linnaeus), longleaf pine (*Pinus palustris* Miller), and loblolly pine (*Pinus taeda* Linnaeus). This species probably breeds in all varieties of pine, as most of the writers simply record it as breeding in dead pines.

Notwithstanding the wide area over which this species is distributed, there seems to be very little variation, except in size and color, but the specimens from the northern regions are darker in color than those from the south. The specimens from the subtropical region of Florida are more strongly shining, more cupreous, a little more sparsely punctured, and the legs and antennae are greener, and at first glance would suggest a different species, but by comparison with the darker forms no differences of specific rank can be found. This may be the species described by Kerremans from Florida as *lata*, but it is impossible to identify the species from his description. In a few cases the pronotum is widest at the apical fourth, with the sides obliquely converging posteriorly, and the small callosities on the front of the head are absent. Sometimes the prosternum is smooth at the middle, and without a median lobe, and the eighth abdominal tergite of the male is slightly emarginate at the apex. The length is from 7.5 to 13.5 mm.

Chamberlin (1926) gives the type locality as Florida, which is incorrect, as Gory (1840) described this species from a specimen in his collection from "Amérique Boréale," without giving any definite locality. The name of the species was originally spelled "*floricolla*," which was a typographical error, but was corrected to *floricola* by Gory on the plate and in his table to the species in the same publication. The specimen from the District of Columbia in the LeConte collection labeled "*C. floricola* Gory, *calcarata* Melsh., *femorata* Lap." is probably the specimen which LeConte compared with the types of Castelnau and Gory in the collection of Count Mniszech in Paris, and from which he recorded his synonymy.

(52) Chrysobothris adelpha Gemminger and Harold

(Fig. 52; fig. 118, *D*)

Chrysobothris soror LeConte (not Castelnau and Gory 1837), 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 232; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90.

Chrysobothris adelpha Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1423 (new name for *soror* LeConte, not Castelnau and Gory); Harold, 1869, Coleopt. Hefte, v. 5, p. 124; Saunders, 1871, Cat. Buprestidarum, p. 99.

Chrysobothris femorata Horn, 1886, Amer. Ent. Soc. Trans. 13: 77–79 (part); Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 213 (part); Fiske, 1902, Ga. State Hort. Soc. Proc. 26: 75, fig. 7; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 150–155 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 624–633 (part).

This species resembles *femorata* very closely but it differs from that species in having the clypeus acutely notched at the middle and not semicircularly rounded on each side, the male genitalia slightly constricted behind the middle, with the lateral lobes equal in length and the lateral spines transverse on each side, the last visible abdominal sternite of the female strongly, transversely sinuate at the apex, and the eighth abdominal tergite of the female only slightly depressed on each side of the median carina.

Length 9–15 mm., width 3.5–6 mm.

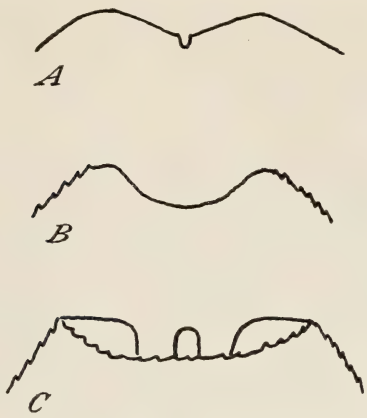

FIGURE 52.—Clypeus (*A*) and last visible abdominal sternite of male (*B*) and of female (*C*) of *Chrysobothris adelpha*.

Type locality.—Western States (no definite locality given); type female, No. 2692, in Museum of Comparative Zoology, simply labeled with a lemon-yellow disk, which signifies Western States. LeConte described the species from the Middle and Western States.

Distribution.—From the material examined the distribution of this species seems to be restricted to the region covered by the genus *Hicoria*. Material has been examined from various localities in the following States: Arkansas, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Texas, Virginia, and West Virginia.

Hosts.—Adults have been examined that were reared by different entomologists from hickory (*Hicoria* sp.) and pecan (*Hicoria pecan* (Marshall) Britton). The adults are reported in Georgia as feeding at the bases of pecan twigs sufficiently to weaken the twigs, which were later broken off by the wind.

This species was first described by LeConte (1859) under the name *soror*, but since this name was preoccupied by *soror* Castelnau and Gory, 1837, for a species from Cayenne, Gemminger and Harold (1869) renamed *soror* LeConte, calling it *adelpha*. About the same variation is found in this species as that given for *femorata*.

(53) CHRYSOBOTHRIS RUGOSICEPS Melsheimer

(Fig. 118, *E*)

Chrysobothris rugosiceps Melsheimer, 1844, Acad. Nat. Sci. Phila. Proc. 2: 147–148.

Chrysobothris femorata LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 231–232 (part); Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1425 (part); Horn, 1886, Amer. Ent. Soc. Trans. 13: 77–79 (part); Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 213 (part); Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 150–155 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 624–633 (part).

In the typical form of *rugosiceps* the antenna is not distinctly narrowed to the apex, but has the segments more or less yellowish at the outer margins, and the last segment transverse or quadrate and as wide as the tenth segment,

the tip of the median lobe of the male genitalia is not wider than the tip of the lateral lobe, and the median carina on the eighth abdominal tergite of the female extends beyond the apical notch, whereas in *femorata* the antenna is gradually narrowed to the apex, and the last segment is narrower than the tenth, the tip of the median lobe of the male genitalia is wider than the tip of the lateral lobe, and the median carina on the eighth abdominal tergite of the female does not extend beyond the apical notch. In a large series of reared specimens of these species the above characters are constant, with very little variation, but in collected specimens intermediate forms will be found.

Length 9–16 mm., width 3.75–7 mm.

Type locality.—Pennsylvania (probably York County).

Distribution.—Specimens have been examined from Manitoba, Canada, and the District of Columbia, and from various localities in the following States: Arkansas, Connecticut, Florida, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, Tennessee, Texas, Virginia, and West Virginia.

Hosts.—Adults have been examined that were reared from chestnut (*Castanea dentata* (Marshall) Borkhausen), white oak (*Quercus alba* Linnaeus), and bur oak (*Quercus macrocarpa* Michaux).

Melsheimer had both sexes when he described the species, and a female examined in the LeConte collection labeled "*rugosiceps*" may be one of the types. About the same variation in this species is found as that given for *femorata*.

(54) Chrysobothris viridiceps Melsheimer

(Fig. 118, *F*)

Chrysobothris viridiceps Melsheimer, 1844, Acad. Nat. Sci. Phila. Proc. 2: 147; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1425.

Chrysobothris femorata LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 231–232 (part); Horn, 1886, Amer. Ent. Soc. Trans. 13: 77–79 (part); Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 213 (part); Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 150–155 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 624–633 (part).

This species so closely resembles *femorata* that it seems necessary merely to give the differences.

Male.—Differing from the male of *femorata* in having the under side of the body and legs more greenish, the antennal segments distinctly pale yellow toward outer margins, the eighth abdominal tergite slightly, broadly emarginate at apex, and the sides of the genitalia broadly rounded and not constricted near apex.

Female.—Differing from the female of *femorata* in not having the eighth abdominal tergite deeply depressed on each side of the median carina.

Length 8–13 mm., width 3–5.5 mm.

Type locality.—Pennsylvania (probably York County).

Redescribed from a male in the United States National Museum from Philadelphia, Pa., which has been compared with a male in the Melsheimer collection labeled "*viridiceps* M. Pa. Ziegler." If this is not the type, it is a specimen compared by Ziegler with the type.

Distribution.—Specimens have been examined from the District of Columbia and various localities in the following States: Georgia, Illinois, Iowa, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New York, Pennsylvania, Rhode Island, Texas, Virginia, and West Virginia.

Hosts.—Adults have been reared from red maple (*Acer rubrum* Linnaeus), red oak (*Quercus* sp.), and cherry.

About the same variations are found in this species as in *femorata.*

(55) Chrysobothris femorata (Olivier)

(Fig. 53; fig. 119, *A*)

Buprestis femorata Olivier, 1790, Entomologie, v. 2, Gen. 32, pp. 47–48, pl. 11, fig. 121; Herbst, 1801, Natursystem Insekten, Käfer, v. 9, p. 226, pl. 152, fig. 4; Fabricius, 1801, Systema Eleutheratorum, v. 2, p. 208; Schönherr, 1817, Synonymia Insect., v. 1, pt. 3, p. 235; Dejean, 1821, Cat. Coléopt., p. 30.

Chrysobothris femorata Dejean, 1833, Cat. Coléopt., ed. 2, p. 80; 1836, ed. 3, p. 90; Mannerheim, 1837, Soc. Imp. Nat. Moscou Bul. 10 (8): 76; LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 231–232; Horn, 1886, Amer. Ent. Soc. Trans. 13: 77–79, pl. 2, figs. 30–34; Blatchley, 1910, Coleoptera of Indiana, pp. 789–790, fig. 302; Burke, 1917, Jour. Econ. Ent. 10: 328; 1919, Jour. Econ. Ent. 12: 326–330; Knull, 1925, Ohio State Univ. Studies 2 (2): 28–29, pl. 1, fig. 27; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 150–155; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 624–633.

Buprestis (Odontomus) femorata Kirby, 1837, Fauna Boreali-Amer. 4: 156.

Buprestis insculpta Herbst, 1801, Natursystem Insekten, Käfer, v. 9, pp. 145–146, pl. 146, fig. 10; Schönherr, 1817, Synonymia Insect., v. 1, pt. 3, p. 235. (Described from Germany, but placed by Schönherr as a synonym of *femorata.* The type may be erroneously labeled as to locality or wrongly identified.)

Chrysobothris quadriimpressa Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris,* p. 48, pl. 9, fig. 64, addenda, p. 7.

Chrysobothris lesueuri Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris,* pp. 49–50, pl. 9, fig. 66; Knull, 1925, Ohio State Univ. Studies 2 (2): 29; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 155.

Chrysobothris dentipes Castelnau and Gory (not Germar), 1837, Monog. Buprestides, v. 2, *Chrysobothris,* p. 52, pl. 9, fig. 70.

Chrysobothris nigritula Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris,* p. 54, pl. 10, fig. 73.

Chrysobothris cribraria Dejean, 1833, Cat. Coléopt., ed. 2, p. 80; 1836, ed. 3, p. 90 (no description); Mannerheim, 1837, Soc. Imp. Nat. Moscou Bul. 10 (8): 77.

Chrysobothris dissimilis Dejean, 1833, Cat. Coléopt., ed. 2, p. 80; 1836, ed. 3, p. 90 (no description); Gory, 1840, Monog. Buprestides, sup. 4, pp. 181–182, pl. 31, fig. 177.

Chrysobothris alabamae Gory, 1840, Monog. Buprestides, sup. 4, pp. 185–186, pl. 32, fig. 183.

Chrysobothris obscura LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 232–233.

Chrysobothris misella LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 233.

Chrysobothris difficilis Le Conte, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 332. (Credited to Gory, but is probably a typographical error for *dissimilis* Gory, as no *Chrysobothris* has been described under the name *difficilis.*)

Chrysobothris semisculpta Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90. (Probably a typographical error for *insculpta* Herbst.)

Over 450 citations to the literature are listed but only a few of the more important ones are given above.

Male.—Broadly elongate, rather strongly flattened above, moderately shining, greenish to purplish black, with a more or less distinct reddish-cupreous tinge; beneath reddish cupreous, with a slight greenish tinge, and more strongly shining than above.

Head brownish cupreous, with a broad, smooth, longitudinal carina on occiput; front nearly flat; surface coarsely, confluently punctate, rather densely clothed with long, erect, white hairs; clypeus acutely notched at middle, semicircularly rounded on each side. Antenna bronzy green basally, becoming reddish cupreous toward apex, slightly narrowed to apex; intermediate segments compact, about as long as wide, broadly rounded at outer margins; third segment nearly as long as the following two segments united; eleventh segment oblong, narrower than the tenth segment.

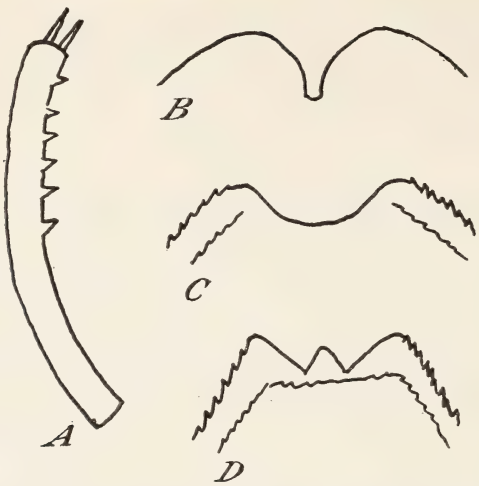

FIGURE 53.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris femorata.*

Pronotum twice as wide as long, distinctly wider at base than at apex, widest near apex; sides nearly parallel along middle, converging posteriorly and anteriorly; anterior margin broadly, arcuately emarginate, without a distinct median lobe; base arcuately emarginate on each side, median lobe strongly produced and broadly rounded; disk slightly uneven, with a faint, longitudinal, median depression; surface rather densely, irregularly punctate, with numerous slightly elevated, smooth spaces.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, coarsely, rather densely, irregularly punctate. Each elytron with four more or less distinct, longitudinal, smooth costae, connected to one another by transverse, irregular, smooth spaces, and with two slightly depressed, irregular, transverse foveae, one near middle, the other at apical third.

Abdomen beneath sparsely, coarsely, irregularly punctate, sparsely clothed with short, semierect, white hairs, without distinct lateral callosities, intervals finely granulose; last visible sternite semicircularly emarginate at apex, with a serrate submarginal ridge, lateral margins coarsely serrate; eighth tergite thickened at apex, with a deep, narrow, median notch, surface coarsely, sparsely punctate. Prosternum coarsely, densely punctate laterally, smooth at middle, rather densely clothed with long, erect hairs; anterior margin without a median lobe. Anterior femur with a large, obtuse tooth, which is slightly dentate on outer margin. Anterior and middle tibiae strongly arcuate, armed with numerous small teeth on inner margins; posterior tibia straight.

Length 12 mm., width 5 mm.

Female.—Differing from the male in having the antenna uniformly reddish cupreous, sometimes with a faint greenish tinge, the last visible abdominal sternite broadly, arcuately emarginate and tridentate at apex, with the median tooth long and narrow, and the lateral tooth on each side broadly rounded, the eighth tergite coarsely, confluently punctate, with strongly elevated median and lateral carinae, deeply depressed between the carinae, and with a deep, narrow, apical notch, and the anterior and middle tibiae slightly arcuate, and unarmed on inner margins.

Redescribed from a male and female from Fort Valley, Ga., in the United States National Museum.

Type localities.—Of *femorata*, Georgia. Of *insculpta*, Germany. Of *quadriimpressa*, *dentipes* Castelnau and Gory (not Germar), and *dissimilis*, "Amérique Boréale." Of *lesueuri*, "Amérique Septentrionale".

Of *nigritula*, Philadelphia. Of *alabamae*, Alabama. Of *cribraria*, Pennsylvania. Of *obscura*, "Southern and Western States," type No. 2691, simply labeled with an orange disk. Of *misella*, "Saratoga," type No. 2690, simply labeled with a pink disk. The types of *obscura* and *misella* are in the Museum of Comparative Zoology, Cambridge, Mass., but the present location of the types of the other species listed above is unknown to the writer.

Distribution.—This is the most widely distributed species of *Chrysobothris* in North America, as it has been recorded from Mexico, all parts of Canada from the Atlantic to the Pacific Ocean, and from all sections of the United States. It has been found in imports into New Zealand and the Hawaiian Islands. Material has been examined from the District of Columbia, Lower California, and various localities in nearly all the States.

Hosts.—This species is recorded as breeding in the bark and sapwood of a great variety of dead or dying fruit and forest trees. Trees that had been recently planted and have not become well established seem to be especially susceptible and are the easy prey of this insect. Adults have been recorded as feeding at the base of the twigs and as partially defoliating young trees. Trees may be killed outright, or the tops killed the first season and the lower part of the tree attacked during a later season. Material has been examined by the writer that was reared from the following trees: Aspen (*Populus tremuloides* Michaux), sycamore (*Platanus occidentalis* Linnaeus), silver maple (*Acer saccharinum* Linnaeus), black walnut (*Juglans nigra* Linnaeus), chestnut (*Castanea dentata* (Marshall) Borkhausen), white willow (*Salix lasiolepis* Bentham), Highland live oak (*Quercus wislizenii* De Candolle), coast live oak (*Quercus agrifolia* Née), valley white oak (*Quercus lobata* Née), California black oak (*Quercus kelloggii* Newberry), white oak (*Quercus alba* Linnaeus), willow oak (*Quercus laurifolia* Michaux), red gum (*Liquidambar styraciflua* Linnaeus), American elm (*Ulmus americana* Linnaeus), hackberry (*Celtis occidentalis* Linnaeus), Japanese redbud (*Cercis japonica*), apple (*Malus* sp.), boxelder (*Acer negundo* Linnaeus), red ash (*Fraxinus pennsylvanica* Marshall), red maple (*Acer rubrum* Linnaeus), mountainash (*Sorbus* sp.), pin oak (*Quercus* sp.), red oak (*Quercus* sp.), peach (*Amygdalus persica* Linnaeus), plum (*Prunus domestica* Linnaeus), and Chinese elm (*Ulmus parvifolia*).

The size, color, sculpture, and color and shape of the foveae on the elytra are quite variable. The color of the head varies from bronzy green to bronzy cupreous, and frequently there are two small, smooth callosities or chevrons on the front. Sometimes the antenna is uniformly bronzy green, in which case the outer margins of the segments are piceous. The foveae on the elytra vary in color from bright green to reddish cupreous, and are sometimes divided by the costae. The sides of the pronotum are usually parallel and sinuate at the middle, but occasionally specimens are found with the sides obliquely converging from near the apex to the base. The sides of the male genitalia are more strongly constricted in some specimens than in others, and the teeth on the tibia are variable in size and number, frequently varying in number on the anterior tibiae of the same specimen. The eighth abdominal tergite of the female is variable in shape, sometimes very

deeply depressed on each side of the median carina, and with a distinctly elevated lateral carina on each side; in other specimens the surface is only slightly depressed on each side and without distinct lateral carinae. The length is from 7.5 to 16 mm.

This species is commonly known as the flatheaded apple tree borer.

It is impossible to identify the forms described by Castelnau and Gory from their inadequate descriptions, but the writer has accepted the synonymy recorded by LeConte after his study of the types in the collection of Count Mniszech in Paris.

Chamberlin (1926) gives the type locality of *femorata* as "Boreal America," but Olivier described the species from material collected by John Francillon in Georgia, and Fabricius (1801) recorded it from material collected by Bosc in Carolina.

This species seems to be at present in a high stage of evolution, so interbreeding will take place between the different forms, and intermediate forms can be expected to occur.

(58) CHRYSOBOTHRIS LILACEOUS Chamberlin

(Fig. 54)

Chrysobothris lilaceous Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 190–191 (separate, pp. 189–190) ; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 160; Chamberlin, 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 639.

FIGURE 54.—Clypeus (*A*) and last visible abdominal sternite of female (*B*) of *Chrysobothris lilaceous*

Female.—Rather broadly elongate, moderately convex above, rather strongly shining, reddish cupreous, with elevated spaces piceous; beneath purplish cupreous, more strongly shining than above.

Head uniformly reddish cupreous, slightly greenish behind clypeus, with two small, irregular, smooth callosities on front and a narrow, longitudinal, smooth carina on occiput; front slightly convex; surface coarsely, deeply, rather densely, irregularly punctate, sparsely clothed with moderately long, semierect, white hairs, intervals vaguely granulose; clypeus deeply, narrowly, angularly emarginate in front, obliquely sinuate on each side. Antenna uniformly brownish cupreous, slightly narrowed to apex; intermediate segments not compact, slightly wider than long, broadly rounded at outer margins; third segment as long as following two segments united.

Pronotum twice as wide as long, distinctly narrower at apex than at base, widest at apical third; sides strongly, arcuately converging anteriorly, slightly, arcuately converging from apical third to posterior angles; anterior margin arcuately emarginate, with a broad, vague, median lobe; base slightly, arcuately emarginate on each side, median lobe moderately produced, and subtruncate in front of scutellum; disk slightly convex, without depressions or elevated callosities; surface coarsely, rather densely, irregularly punctate, rugose at sides, with a narrow, smooth, median space extending from base to apical third, and four rounded, smooth spaces arranged transversely in front of middle, intervals finely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions very deep; humeral depressions shallow; surface glabrous, uneven, finely, confluently punctate in depressed areas, very sparsely punctate on the dark, elevated spaces. Each elytron with a strongly elevated, straight, longitudinal costa along sutural margin on apical half, merging into a broad, irregular, dark, elevated space on basal half, with numerous irregular, elevated, dark spaces, and with two more or less distinct discal foveae, a small one in front of middle and a large, obliquely transverse one behind middle.

Abdomen beneath coarsely, irregularly fossulate-punctate, more or less transversely rugose at sides, smooth along anterior and posterior margins of sternites, sparsely clothed with rather short, recumbent, inconspicuous hairs, intervals indistinctly granulose; last visible sternite sinuate at apex, with a shallow, transverse, median notch, and an obscure, submarginal ridge on each side at basal half, lateral margins coarsely serrate; eighth tergite densely, finely granulose, coarsely, confluently punctate, broadly rounded and thickened at apex, but not longitudinally carinate. Prosternum coarsely, rather densely, irregularly punctate, sparsely clothed with moderately long, recumbent, white hairs; anterior margin arcuately rounded, with a broad, moderately long, median lobe. Anterior femur with a distinct, obtuse tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae arcuate; posterior tibia straight.

Length 11 mm., width 4.5 mm.

Male.—Unknown.

Redescribed from the female type in the collection of W. J. Chamberlin.

Type locality.—Six miles west of Klamath Falls, Oreg.

Distribution.—Only two females (type and paratype) have been examined. Both specimens were collected at the type locality on June 14, 1922, by W. J. Chamberlin.

Host.—The larval habits are unknown, but the adults were collected on the western juniper (*Juniperus occidentalis* Hooker), which is probably the host for this species.

No variation was observed in the two specimens examined, except in length, which ranged from 10.5 to 11 mm.

(57) Chrysobothris juniperinus Chamberlin

(Fig. 55; fig. 119, *B*)

Chrysobothris juniperinus Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 192–193 (separate, pp. 191–192); 1926, Cat. Buprestidae North Amer., p. 158; 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 637; Chamberlin, 1934, Pan-Pacific Ent. 10: 40, fig. 18.

Female.—Only differing from the female type of *lilaceous* Chamberlin in being more narrowly elongate and in having the third segment of the antenna slightly shorter than the following two segments united.

Length 9 mm., width 3.4 mm.

Male.—Differing from the female in having the front of the head slightly flatter and more densely pubescent, the last visible sternite semicircularly emarginate at apex, the eighth tergite more sparsely punctured and the upper margin projecting and angularly emarginate at apex, and in having the anterior tibia armed with an elongate dilation near apex and with the tibia constricted behind the dilation.

Length 8.5 mm., width 3 mm.

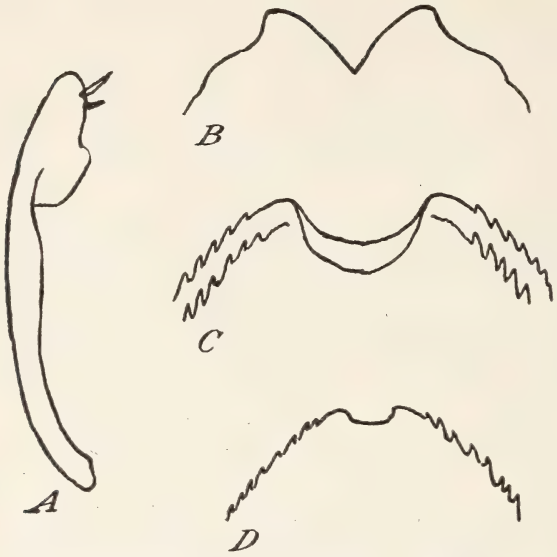

FIGURE 55.—Anterior tibia of male ((*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris juniperinus*.

Redescribed from the female and male types in the collection of W. J. Chamberlin.

Type locality.—Stein Mountains, at an elevation of 7,500 feet, Harney County, Oreg.

DISTRIBUTION

From material examined:

CALIFORNIA: Willow Ranch (G. R. Struble).

OREGON: Stein Mountains (7,500 feet altitude), Harney County, June 22–24, 1922, female and male types (W. J. Chamberlin). Sisters, June 23, 1938 (Frank M. Beer). Two miles east of Redmond, June to August (Gray and Schuh).

Hosts.—The larval habits are unknown, but the adults have been collected on freshly cut Rocky Mountain red cedar (*Juniperus scopulorum* Sargent) posts by W. J. Chamberlin, and on western juniper (*Juniperus occidentalis* Hooker) by Gray and Schuh.

The sculpture and color on the dorsal surface of the body are rather uniform, although some specimens are slightly more cupreous than others. The third segment of the antenna is variable in length, in some examples being shorter than the following two segments united, whereas in others it is as long as these segments, and the clypeus is slightly sinuate on each side of the median, angular emargination in some specimens. Some specimens of both sexes are more robust than others and are of the same shape as in *lilaceous*. The apex of the last visible abdominal sternite in the female is either rounded or slightly emarginate. The length is from 7.75 to 12.5 mm. and the width from 3 to 5 mm.

The female paratype of *juniperinus* was carefully compared with the female type of *lilaceous* and no characters could be found for

separating the two species, except that the type of *lilaceous* is slightly broader, more cupreous, and the third segment of the antenna is as long as the following two segments united. In a good series of specimens collected in the same locality and on the same host plant by Gray and Schuh the differences given above proved to be variable in the specimens examined. These two species seem to be identical, but the writer is retaining both names until more material and males of *lilaceous* are available for study. In case they should prove to be the same species, *lilaceous* will have page priority.

(58) CHRYSOBOTHRIS BURKEI Chamberlin

(Fig. 56; fig. 119, *C*)

Chrysobothris burkei Chamberlin, 1929, Pan-Pacific Ent. 5: 110–111, figs. 2–3; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 613.

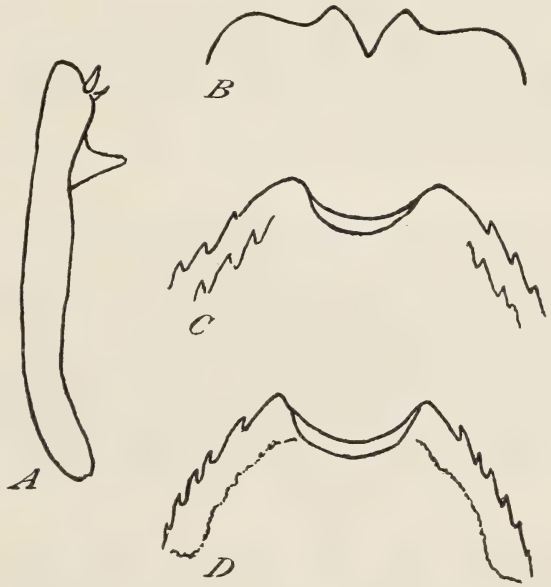

FIGURE 56.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris burkei*.

Male.—Moderately elongate, moderately convex above, rather strongly shining, purplish brown on smooth elevations, cupreous to bronzy green in the punctured, depressed areas; beneath varying from reddish cupreous to golden green.

Head bluish green anteriorly, becoming brownish cupreous on vertex and occiput, with two small, more or less distinct callosities on front, and a distinct, smooth, longitudinal carina on occiput, the carina slightly bifurcate anteriorly; front nearly flat; surface coarsely, irregularly, confluently punctate, transversely rugose behind clypeus, rather densely clothed with long, erect, inconspicuous hairs, intervals densely granulose; clypeus acutely, angularly notched at middle, feebly, obtusely toothed on each side of notch, then transversely sinuate externally. Antenna bronzy green basally, brownish cupreous apically, slightly narrowed to apex; intermediate segments triangular, not compact, slightly wider than long, broadly rounded at outer margins; third segment slightly shorter than following two segments united.

Pronotum nearly twice as wide as long, slightly wider at base than at apex, widest near apical third; sides rounded anteriorly, strongly converging from apical third to near posterior angles, where they are parallel; anterior margin slightly

sinuate, with an indistinct, broadly rounded, median lobe; base arcuately emarginate on each side, median lobe slightly produced and broadly rounded; disk uneven, with numerous irregular, smooth spaces; surface coarsely, irregularly punctate between smooth spaces, clothed with a few erect hairs at sides.

Elytra slightly wider than pronotum, twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal depression broad and shallow; humeral depressions small and shallow; surface glabrous, densely, coarsely, irregularly punctate between elevated, smooth spaces. Each elytron with a longitudinal costa near sutural margin, costa strongly elevated on apical half, becoming broader toward base, with numerous large, transverse, irregular, elevated, smooth spaces, and with a large, more or less distinct, transverse fovea at apical third, and a vague one just in front of middle.

Abdomen beneath strongly flattened, sparsely, coarsely, irregularly punctate, sparsely clothed with short, semierect, inconspicuous hairs, and with distinct lateral callosities, the intervals densely, finely granulose; last visible sternite deeply, semicircularly emarginate at apex, with a serrate submarginal ridge, lateral margins coarsely serrate; eighth tergite densely granulose, coarsely, sparsely punctate, slightly notched at apex. Prosternum coarsely, confluently punctate, densely clothed with long, erect, white hairs; anterior margin with a distinct, narrow, median lobe. Anterior femur with a short, obtuse tooth, which is coarsely dentate on outer margin. Anterior tibia strongly arcuate, with a large, acute tooth at apical fourth; middle and posterior tibiae straight.

Length 9 mm., width 3.5 mm.

Redescribed from the male type in the collection of W. J. Chamberlin.

Female.—Differing from the male in having the head uniformly reddish cupreous, with a faint golden tinge, and more sparsely pubescent, the antenna uniformly brownish cupreous, the eighth tergite confluently punctured and broadly rounded at apex, the prosternum sparsely, coarsely punctured and sparsely pubescent, and the anterior tibia unarmed at apex. The emargination at the apex of the last visible sternite is similar in both sexes.

Type locality.—Big Basin, San Mateo County, Calif.

Distribution.—Only six specimens (including the type) were examined by the writer, all of which were collected at the type locality.

Host.—All the specimens examined were reared from knobcone pine (*Pinus attenuata* Lemmon) collected by H. E. Burke. Chamberlin records them as having been reared from Jeffrey pine (*Pinus jeffreyi* "Oreg. Com."), which is incorrect.

The pronotum is more cupreous or greenish in some specimens, and the color on the lower part of the head in the males varies from bluish green to golden green. In one specimen examined the longitudinal carina on the head is not bifurcate anteriorly, and the callosities on the front of the head are absent. The sides of the pronotum usually converge from the apical third to the posterior angles, but in one specimen the sides are parallel and sinuate at the middle. The length is from 6.5 to 9.5 mm.

(59) CHRYSOBOTHRIS SUBOPACA Schaeffer

Chrysobothris subopaca Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 208; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 173; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 653.

"Elongate, slightly depressed, color green, each elytron with an elongate irregular purple spot at apical third, surface subopaque, beneath shining green. Antennae aeneo-cupreous, third joint a little longer than fourth, front slightly convex, with a faint chevron; clypeus triangularly emarginate; thorax twice as wide as long, arcuate at sides, disk convex, a moderately deeply impressed line at middle, a vague median impression at sides near margin, somewhat coarsely

punctured, more densely at sides. Elytra a little wider than the thorax, parallel, narrowing to apex at apical third, margin feebly serrulate, apices obtuse; disk very slightly depressed, costae obliterated in front, faintly indicated behind, basal foveae faintly indicated, between the first and second costae at middle a faint longitudinal impression, surface uneven, finely rugose, punctation finer than that of thorax, becoming obsolete toward apex. Body beneath transversely confluently punctured, last segment with a feeble serrulate margin, prosternum lobed in front; anterior femur with a moderately large tooth, serrulate externally.

"Tulare Co., California, one male in collection of Dietz.

"*Male.*—Prosternum distinctly depressed at middle, densely punctate, sparsely pubescent, anterior tibiae nearly straight, with a very feeble dilation at tip; middle tibiae nearly straight, dilated at tip, posterior tibiae straight; last ventral segment semicircularly emarginate; last dorsal truncate at tip, somewhat coarsely punctate.

"Length 7 mm.

"Although a little more depressed than *cyanella* Horn it is best placed near that species from which it differs by the opaque surface, the entirely different surface sculpture and the two irregular elongate purple spots at apex of elytra, which are perhaps as variable as in *lucana* and *purpureoplagiata*."

The above is a copy of the original description. Schaeffer's original spelling is *subapaca*, which is presumably a typographical error for *subopaca*, as he probably intended so naming the species because the dorsal surface of the body is subopaque. This species was described from a single male in the Dietz collection, but this type cannot be located, and no specimens which could be identified as this species have been seen by the writer.

(60) Chrysobothris verdigripennis Frost

(Fig. 57; fig. 119, *D*)

Chrysobothris verdigripennis Frost, 1910, N. Y. Ent. Soc. Jour. 18: 43–45; Fall, 1910, N. Y. Ent. Soc. Jour. 18: 49, fig. 1b; Gibson, 1913, Ent. Soc. Ontario Ann. Rpt. (1912) 43: 126; Frost, 1920, Canad. Ent. 52: 231–232, 249; Knull, 1922, Canad. Ent. 54: 83; Frost, 1923, Canad. Ent. 55: 281; 1924, Brooklyn Ent. Soc. Bul. 19: 34; Knull, 1925, Ohio State Univ. Studies 2 (2): 30–31; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 176; Leonard, 1928, N. Y. (Cornell) Agr. Expt. Sta. Mem. 101: 360; Frost, 1928, Brooklyn Ent. Soc. Bul. 23: 135; Chamberlin, 1934, Pan-Pacific Ent. 10: 41, fig. 23; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 657.

Figure 57.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris verdigripennis*.

Male.—Broadly elongate, slightly convex above, rather strongly shining, piceous, with a vague purplish reflection on elevated spaces, bronzy green in depressed areas; beneath bronzy green, with a distinct cupreous tinge, and more strongly shining than above; tarsi violaceous black.

Head bright green, with two small, smooth callosities on front, and a smooth, longitudinal carina on occiput; front nearly flat; surface coarsely, deeply, confluently punctate, sparsely clothed with moderately long, semierect, inconspicuous hairs, clypeus deeply, broadly, angularly emarginate in front, subtruncate on each side. Antenna bronzy green on basal segments, gradually narrowed to apex; intermediate segments not compact, about as long as wide, broadly rounded at outer margins; third segment one-half longer than fourth; fourth to eleventh segments with the lobes partially yellowish testaceous, the testaceous area increasing in size from the fourth to the eleventh segment.

Pronotum nearly twice as wide as long, wider at base than at apex, widest along middle; sides sinuate and nearly parallel at middle, converging anteriorly and posteriorly, more arcuately toward apical angles; anterior margin broadly, arcuately emarginate, without a distinct median lobe; base transversely sinuate on each side, with median lobe slightly produced, and truncate in front of scutellum; disk slightly convex, uneven, with a broad, longitudinal, median depression, limited on each side at apical half by an irregular, elongate, smooth, elevated callosity, and on each side midway between this callosity and lateral margin with a number of more or less connected, irregular, smooth callosities; surface coarsely, densely, deeply, irregularly punctate between the smooth callosities, and clothed with a few short, erect, inconspicuous hairs.

Elytra wider than pronotum, three-fifths longer than wide, widest behind middle; sides feebly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins slightly serrate; basal depressions elongate and deep; humeral depressions rounded and moderately deep, surface glabrous, uneven, densely, finely, irregularly punctate in depressed areas. Each elytron with four more or less distinct, longitudinal costae; first strongly elevated on apical half, interrupted basally, sinuate near apex; second and third indicated by short ridges and callosities, jointed to each other and first costa; and fourth slightly indicated basally, and following outline of lateral margin.

Abdomen beneath rather densely, irregularly fossulate-punctate, more confluently and forming crenulate ridges at sides, sparsely clothed with short, recumbent, white hairs, without distinct lateral callosities, intervals indistinctly granu'ose; last visible sternite semicircularly emarginate at apex, slightly elevated at sides but without a distinct submarginal ridge, lateral margins serrate; eighth tergite deeply, angularly emarginate at apex, coarsely, densely punctate posteriorly, densely, finely granu'ose anteriorly, but not longitudinally carinate. Prosternum confluently, coarsely punctate, transversely rugose anteriorly, sparsely clothed with moderately long, semierect, white hairs; anterior margin broadly rounded and strongly deflexed at middle, but without a distinct median lobe. Anterior femur with an obtusely rounded tooth, which is dentate on outer margin. Anterior and middle tibiae arcuate, the former with a large, triangular dilation at apex, and the latter gradually expanded toward apex; posterior tibia nearly straight.

Length 14 mm., width 6.5 mm.

Redescribed from the male type, No. 2696, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—Differing from the male in having the front of the head usually more bronzy green, the last visible sternite more elongate and narrowly, deeply emarginate at apex, the eighth tergite rounded or vaguely emarginate at apex, and more coarsely, densely punctured, and the anterior tibia unarmed at apex.

Type locality.—Wales, Maine.

DISTRIBUTION

From material examined:

CONNECTICUT: New Haven, reared (R. B. Friend).
MAINE: Wales, July 23, 1908, type (C. A. Frost).
MASSACHUSETTS: Arnold Arboretum, Boston, July 12, 1921 (H. Morrison). Tyngsboro, July 12, 1896 (Frederick Blanchard).

MANITOBA: Victoria Beach, August 8 (G. S. Brooks).
ONTARIO: Macdiarmid, July 17, 1922 (N. K. Bigelow).

Recorded in the literature from:

CONNECTICUT: Cornwall, July 8 (C. A. Frost).
MAINE: Monmouth (C. A. Frost).
MANITOBA: Le Pas (C. A. Frost).
MICHIGAN: Lake Superior (C. A. Frost).
NEW YORK: Catskill Mountains; Minerva July 20, 1925 (C. A. Frost). Wallface Mountains, July (A. Nicolay). Fort Montgomery, July; Bear Mountains, July (Schott).
NOVA SCOTIA: Port Maitland, August 2, 1910 (W. Rieff).
PENNSYLVANIA: Montebello, reared (Guyton and Knull).
VERMONT: No definite locality (C. A. Frost).

Hosts.—Knull (1922) records this species as working in scars and injuries on living hemlock (*Tsuga canadensis* (Linnaeus) Carrière) in Pennsylvania, the larva working beneath the bark and pupating in the sapwood, and it has been reared from Norway spruce (*Picea abies* (Linnaeus) Karsten) in Connecticut by R. B. Friend. Frost (1910) records the adults on beech (*Fagus grandifolia* Ehrhart) in Maine. Morrison found a specimen on pine (*Pinus* sp.) in Massachusetts, and Bigelow collected a large number of adults on balsam fir (*Abies balsamea* (Linnaeus) Miller) and on white spruce (*Picea glauca* (Moench) Voss) in Ontario.

Very little variation was observed in the specimens examined except in color, which varies in the depressions on the dorsal surface of the body from bright green to brownish cupreous, on the underside of the body from purplish cupreous to a bronzy green with a distinct cupreous tinge, and on the front of the head in the males from bright green to bronzy green, with a more or less cupreous tinge similar to that of the females. The prosternum is usually transversal, truncate in front, but occasionally the anterior margin is broadly rounded and deflexed at the middle. The emargination at the apex of the last visible abdominal sternite in the female is variable in shape. The length is from 12.5 to 16 mm.

It is difficult to separate the cupreous-colored females of this species from the females of *dentipes*, but the males are easily separated by the genitalia and the dilation on the anterior tibia. In *dentipes* the dorsal surface of the body is usually more opaque than in *verdigripennis*.

Mr. Bigelow collected nearly 100 specimens on balsam fir and white spruce in Ontario, where both the green and the dark bronzy specimens were found together, the bronzy form predominating.

(61) CHRYSOBOTHRIS ÈXESA LeConte

(Fig. 58; fig. 119, *E*)

Chrysobothris exesa LeConte, 1858, Acad. Nat. Sci. Phila. Proc. [10]: 68; 1858, Acad. Nat. Sci. Phila. Jour. (ser. 2) 4: 34; 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 231; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1425; Horn, 1883, Amer. Ent. Soc. Trans. 10: 287; 1886, Amer. Ent. Soc. Trans. 13: 95–96, pl. 4, figs. 125–129; Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, p. 41; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 212; Cockerell, 1898, N. Mex. Agr. Expt. Sta. Bul. 28: 152; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 180; Burke, 1918, Jour. Econ. Ent. 11: 211; Van Dyke, 1918, Ent. News 29: 58; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 150; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 623; Chamberlin, 1934, Pan-Pacific Ent. 10: 39.

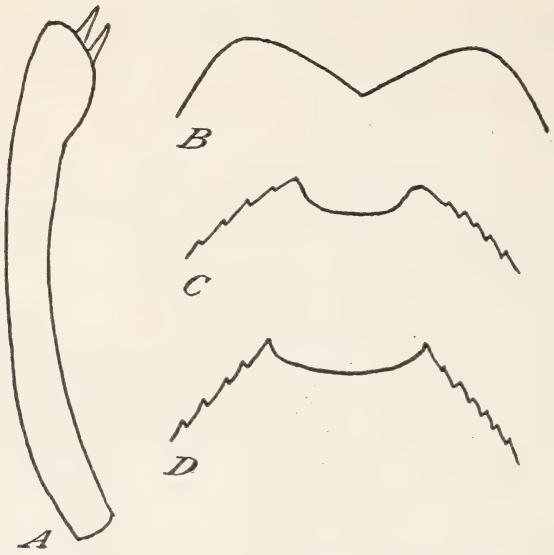

FIGURE 58.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris exesa*.

Female.—Moderately elongate, convex and rather strongly shining above, piceous, with a faint purplish reflection on the smooth spaces, brownish cupreous in the depressed, punctured areas; beneath brownish cupreous, with purplish and greenish reflections in different lights, and more strongly shining than above.

Head uniformly brownish cupreous, with a broad, smooth, longitudinal carina extending from occiput to middle of front, the carina bifurcate on vertex, and connected on each side anteriorly to a broad, irregular, smooth space; front uneven; surface coarsely, irregularly, confluently punctate, somewhat rugose behind clypeus, sparsely clothed with long, recumbent, white hairs, intervals densely granulose; clypeus broadly, deeply, angularly emarginate in front, broadly rounded on each side. Antenna uniformly piceous, with a faint purplish tinge, slightly narrowed to apex; intermediate segments compact, distinctly wider than long, broadly rounded at outer margins; third segment nearly as long as following two segments united.

Pronotum nearly twice as wide as long, slightly wider at base than at apex, widest near apex; sides strongly converging at apex, obliquely converging (slightly sinuate at middle) from near apex to base; anterior margin rather strongly, arcuately emarginate, with a broadly rounded median lobe; base broadly, arcuately emarginate on each side, median lobe rather strongly produced, and broadly truncate in front of scutellum; disk moderately convex, uneven, with a broad, shallow, longitudinal, median depression, four small, more or less distinct, irregular, smooth callosities arranged transversely in front of middle, and on each side at base, midway between middle and lateral margin, an irregular, smooth callosity; surface coarsely, irregularly ocellate-punctate between the smooth callosities.

Elytra slightly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are conjointly broadly rounded; lateral margins coarsely serrate; basal depressions broad, very deep; humeral depressions broad and shallow; disk rather strongly convex, uneven; surface glabrous, densely, deeply, confluently punctate between costae and smooth elevated spaces. Each elytron with four more or less distinct longitudinal costae; first strongly elevated from apex to basal third, irregularly interrupted on basal third; second and third interrupted by broadly expanded and irregular, smooth, elevated spaces; fourth barely indicated, following outline of lateral margin, and with two irregular, transverse, densely punctured, discal foveae, the first between first and third costae in front of middle, and the second between first and third costae on apical third.

Abdomen beneath sparsely, coarsely fossulate-punctate, sparsely clothed with

moderately long, recumbent, white hairs, intervals vaguely granulose, and each sternite with a smooth, strongly elevated callosity on each side near lateral margin; basal sternite slightly, longitudinally concave at middle; last visible sternite broadly, shallowly emarginate at apex, without a submarginal ridge, but with an acutely angulated, strongly elevated, smooth, lateral callosity on each side near base, lateral margins coarsely serrate; eighth tergite broadly rounded at apex, coarsely, densely punctate, slightly, broadly depressed on each side, and more or less longitudinally carinate. Prosternum coarsely, densely punctate, somewhat transversely rugose, sparsely clothed with long, recumbent, white hairs; anterior margin with a distinct, broad, rather long, median lobe. Anterior femur with a large, acute tooth, which is dentate on outer margin. Anterior tibia slightly arcuate, unarmed; middle and posterior tibiae straight. Length 9.5 mm., width 4 mm.

Redescribed from the female lectotype, No. 2701, in the Museum of Comparative Zoology, Cambridge, Mass.

Male.—Differing from the female in having the antenna reddish cupreous, with the outer margins of the segments more or less yellowish, the last visible sternite more deeply, narrowly, arcuately emarginate at apex, the eighth tergite angularly emarginate at apex, sparsely, finely punctate, but not carinate, the prosternum more densely pubescent, and the anterior tibia armed with a short, obscure dilation at apex.

Type locality.—Colorado River, Calif. Type labeled with a gold disk and the identification label marked "Col."

DISTRIBUTION

From material examined:

ARIZONA: No definite locality (H. K. Morrison). Sabino Canyon, April 4–28, reared (W. D. Edmonston and G. Hofer). Santa Catalina Mountains and Redington, reared (M. Chrisman). Carr Canyon, Huachuca Mountains (Horn collection). San Carlos Lake, May (D. K. Duncan).
CALIFORNIA: Colorado River, type (J. L. LeConte).
NEW MEXICO: Las Cruces (T. D. A. Cockerell).
TEXAS: Uvalde, March 30, 1907 (W. F. Fiske). Sanderson, June 10, 1930; Van Horn, May 23, 1932 (E. G. Linsley).

Recorded in the literature from various other localities in Arizona, California, New Mexico, and Texas, and from Sonora, Mexico. Chamberlin (1926) records it from Colorado, but this probably refers to Colorado River, Calif., the type locality.

Hosts.—This species mines the bark, sapwood, and heartwood of dying and dead trees. Adults have been reared from mesquite (*Prosopis juliflora* (Swartz) DeCandolle), and catclaw (*Acacia greggii* Gray) collected in Arizona by G. Hofer and M. Chrisman.

The color and sculpture on the dorsal surface of the body are rather constant, but the smooth elevations on the front of the head are variable in shape. The sides of the pronotum either obliquely converge from near the anterior angles to the posterior angles, or are nearly parallel and sinuate at the middle. Sometimes the segments of the antenna are more or less yellowish along the outer margins and the emargination at the tip of the last visible abdominal sternite in the female is variable in shape. The length is from 8.5 to 12.5 mm.

Chrysobothris exesa was described from a female collected by LeConte on the Colorado River in California, and another female collected by Mr. Schott in Sonora, Mexico. Specimen No. 1 in the LeConte collection is a female labeled with a gold disk and "*C. exesa* Col. Lec.," and is selected as the lectotpye. Specimen No. 2 in the same col-

lection, and simply labeled with a disk, is probably the specimen mentioned by LeConte as having been collected by Schott. Chamberlin (1926) gives the type locality as Arizona, which is incorrect.

(62) CHRYSOBOTHRIS DENTIPES (Germar)

(Fig. 59; fig. 119, *F*)

Buprestis characteristica Melsheimer, 1806, Cat. of Insects of Pennsylvania, p. 45 (no description); Harris, 1829, New England Farmer 8 (1): 2.

Buprestis dentipes Germar, 1824, Insect. Species Novae, v. 1, pp. 38–39; Say, 1836, Amer. Phil. Soc. Trans. (n. s.) 6: 158.

Chrysobothris dentipes Mannerheim, 1837, Soc. Imp. Nat. Moscou Bul. 10 (8): 76; LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 235; Fitch, 1859, N. Y. State Agr. Soc. Trans. 18: 793–794; Harris, 1862, Insects Injurious to Vegetation, pp. 49–50, fig. 24; Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 87–88, pl. 3, figs. 75–79; Packard, 1890, U. S. Ent. Comn. Rpt. 5: 60–64, fig. 15; Felt, 1905–1906, N. Y. State Mus. Mem. 8: 648, 657–658, pl. 20, fig. 11; Blatchley, 1910, Coleoptera of Indiana, pp. 788, 790, figs. 303–305; Chamberlin, 1917, Ent. News 28: 135; 1925, N. Y. Ent. Soc. Jour. (1924) 32: 191 (separate, p. 190); Knull, 1925, Ohio State Univ. Studies 2 (2): 28, 30; Fisher, 1925, U. S. Natl. Mus. Proc. 65 (9): 93, 103–106; Good, 1925, Ent. Soc. Amer. Ann. 18: 258, pl. 9, fig. 19 (wing venation); Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 147–148; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 619–621; Chamberlin, 1934, Pan-Pacific Ent. 10: 41, fig. 22.

Buprestis ruficornis Sturm, 1826, Cat. Insecten-Sammlung, p. 105 (no description).

Chrysobothris plicata Dejean, 1833, Cat. Coléopt., ed. 2, p. 80, 1836, ed. 3, p. 90 (no description).

Chrysobothris posticalis Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, p. 56, pl. 10, fig. 76; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1426 (=*plicata* Dejean).

Chrysobothris planata Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, pp. 56–57, pl. 10, fig. 77.

Chrysobothris rotundicollis Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, p. 51, pl. 9, fig. 69; Fisher, 1925, U. S. Natl. Mus. Proc. 65 (9): 105 (=*dentipes* Germ.).

Chrysobothris ruficornis Sturm, 1843, Cat. Käfer Sammlung, p. 61 (no description); Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1425 (=*dentipes* Germ.).

Chrysobothris maculicornis (LeConte Mss.) Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 211 (=*dentipes* Germ.).

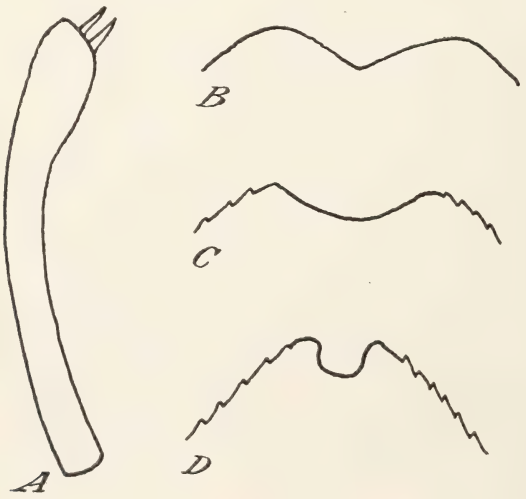

FIGURE 50.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris dentipes*.

Male.—Moderately elongate, strongly depressed above, subopaque, piceous, with a faint bronzy or cupreous reflection, especially in the depressions; beneath purplish brown, and more strongly shining than above.

Head brownish cupreous, with two small, smooth callosities on front, and a narrow, smooth, longitudinal carina on occiput; front flat; surface coarsely, deeply fossulate-punctate, longitudinally rugose on vertex, sparsely clothed with moderately long, semierect, white hairs; clypeus broadly, deeply, triangularly emarginate in front, arcuately rounded on each side. Antenna slightly narrowed to apex, bronzy green, with segments 4 to 11 in greater part brownish yellow; intermediate segments subtriangular, not compact, slightly longer than wide, subtruncate at outer margins; third segment nearly as long as following two segments united.

Pronotum nearly twice as wide as long, slightly narrower at apex than at base, widest at apical third; sides sinuate and slightly converging from apical third to posterior angles, arcuately converging at apical angles; anterior margin broadly, arcuately emarginate, without a median lobe; base broadly, arcuately emarginate on each side, median lobe slightly produced and broadly rounded; disk slightly convex, with a broad, rather deep, median sulcus, which is wider in front, and limited on each side by a broad, smooth, elevated space, between which and the lateral margin the surface is very uneven, and with a narrow, acute carina on each side near posterior angle; surface densely, confluently punctate in depressions, punctures coarser at sides, and sparsely clothed with short, inconspicuous hairs.

Elytra distinctly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to apical third (slightly constricted at apical third), then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, uneven, finely, densely, irregularly punctate between costae. Each elytron with first costa sinuate, rather distinct on apical half, becoming more or less obsolete basally, the other costae replaced by broad, smooth spaces of irregular shape, and with a vague, irregular, transversely oblique fovea behind middle.

Abdomen beneath rather finely, sparsely, irregularly punctate, slightly rugose at sides of basal sternites, sparsely clothed with short, recumbent, inconspicuous hairs, without distinct lateral callosities, intervals indistinctly granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite coarsely, sparsely punctate, densely granulose, rather deeply, triangularly emarginate at apex, but not longitudinally carinate. Prosternum coarsely, densely punctate, smooth at middle, rugose along anterior margin, sparsely clothed with long, recumbent, white hairs; anterior margin slightly arcuate, without a distinct median lobe. Anterior femur with a large, obtusely triangular tooth, which is dentate on outer margin. Anterior and middle tibiae arcuate, and slightly dilated at apices; posterior tibia straight.

Length 16 mm., width 6 mm.

Redescribed from a male in the United States National Museum, collected at North Saugus, Mass., by F. H. Mosher.

Female.—Differing from the male in having the last visible sternite more elongate, and deeply, narrowly emarginate at apex, the eighth tergite coarsely, confluently punctured, and slightly emarginate at apex, and the anterior and middle tibiae not distinctly dilated at their apices.

Type locality.—Of *dentipes*, "America Boreali"; present location of type unknown to writer, but part of the Coleoptera collection of Germar is in the Zoological Museum at Berlin, and part in the Deutsche Entomologische Institut at Dahlem, Germany. Of *posticalis*, *planata*, and *plicata*, "Amérique Boréale"; of *rotundicollis*, Santo Domingo; present location of these types unknown to the writer. Of *ruficornis*, "Amérique Boréale"; type in Munich Museum. Of *characteristica*, probably Massachusetts; type in the collection of the Boston Society of Natural History.

Distribution.—This is one of the most widely distributed species of *Chrysobothris* in North America. Specimens have been examined

from the West Indies, northern Mexico, various localities in southern Canada, and nearly all sections of the United States.

Hosts.—This species seems to be restricted to coniferous trees, and has been reared from northern white pine (*Pinus strobus* Linnaeus), western yellow pine (*Pinus ponderosa* Lawson), and tamarack (*Larix laricina* (DuRoi) Koch). The larvae probably infest nearly all species of *Pinus*, as the adults have been collected on shortleaf pine (*Pinus echinata* Miller), Virginia pine (*Pinus virginiana* Miller), Parry piñon (*Pinus parryana* Engelmann), lodgepole pine (*Pinus contorta* Loudon), and longleaf pine (*Pinus palustris* Miller). The species has been recorded in the literature as attacking oaks (*Quercus* sp.) but these records may be from adults collected on these trees or from misidentified specimens. Harris (1862) states that the adults inhabit trunks of oak trees, but in his notebook he records the adults as having been collected on oak logs.

For a species with such a wide distribution, very little variation is found except in size and color. In most specimens the pronotum is widest at the apical third, with the sides more or less sinuate and converging posteriorly, but occasionally a specimen is found with the sides sinuate and parallel at the middle. There are usually two small callosities on the front of the head, but rarely these are obsolete, and frequently the anterior part of the head of the male is bright green. In nearly all the specimens examined the anterior margin of the prosternum is truncate without any indications of a median lobe, although in a few there is a vague median lobe, but this species should not be placed with those having a median lobe on the prosternum. The sculpture on the dorsal surface of the body is more or less variable, but difficult to describe. The length is from 12 to 18 mm.

Obenberger (1934) places *lata* Kerremans as a synonym of *dentipes*, but this is incorrect, as Kerremans (1899) in his original description of *lata* states that the femoral tooth is pointed, which cannot be applied to *dentipes*.

(63) Chrysobothris dolata Horn

(Fig. 60; fig. 120, *A*)

Chrysobothris dolata Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 87, pl. 3, figs. 71–74; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 212; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 118; Woodworth, 1913, Guide to California Insects, pp. 194, 196; Chamberlin, 1917, Ent. News 28: 136–138, figs. 1–6; Van Dyke, 1924, Pacific Coast Ent. Soc. Proc. 2 (2): 18; Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 191 (separate, p. 190); 1926, Cat. Buprestidae North Amer., p. 149; 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 622; Chamberlin, 1934, Pan-Pacific Ent. 10: 42, fig. 17; Beer, 1940, Pan-Pacific Ent. 16: 16.

Female.—Broadly elongate, strongly depressed above, strongly shining on elevated spaces, uniformly piceous, with a vague bronzy tinge; beneath purplish black, more strongly shining than the depressed areas above.

Head purplish black, with a narrow, smooth, longitudinal carina on the occiput, and two small, smooth callosities on the front; front slightly convex, surface coarsely, deeply, irregularly foveolate-punctate, more or less transversely rugose anteriorly, rather densely clothed with long, erect, white hairs; clypeus broadly, deeply, arcuately emarginate in front, arcuately rounded on each side. Antenna purplish cupreous, gradually narrowed to apex: intermediate segments distinctly wider than long, subtriangular, not compact, broadly rounded at outer margins; third segment as long as following two segments united.

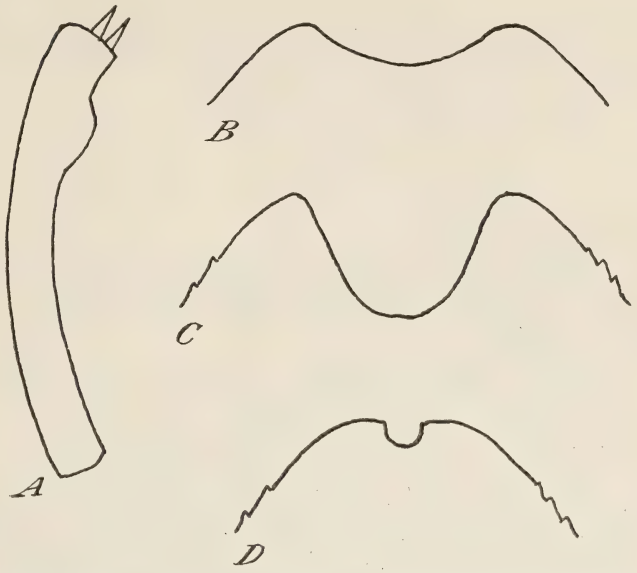

FIGURE 60.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris dolata*.

Pronotum twice as wide as long, slightly wider at base than at apex, widest near apex; sides strongly, arcuately converging at apex, then slightly, obliquely converging from near apex to posterior angles, which are broadly rounded; anterior margin broadly, arcuately emarginate, without a distinct median lobe; base transversely sinuate on each side, the median lobe slightly produced and broadly rounded; disk strongly depressed, very uneven, with two large, irregular depressions on each side of middle, and a broad, elongate depression on each side near lateral margin, but not longitudinally sulcate at middle; surface coarsely, transversely, irregularly rugose, coarsely punctate between rugae, and sparsely clothed with very long, semierect, white hairs.

Elytra distinctly wider than pronotum, about three-fourths longer than wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal and humeral depressions united, forming a deep, transverse depression; surface glabrous, uneven; depressed areas subopaque, densely, finely scabrous, more or less rugose basally. Each elytron with the first costa slightly sinuate, strongly elevated posteriorly, extending from base to apex; second and third costae broadly interrupted, more or less joined to each other by irregular, elevated, smooth spaces; fourth costa slightly elevated, following outline of lateral margin.

Abdomen beneath finely, rather densely, irregularly punctate, more coarsely punctate at sides, sparsely clothed with short, recumbent hairs, broadly depressed on basal segments, but without lateral callosities, intervals vaguely granulose; last visible sternite with a narrow rectangular or arcuate notch at apex, arcuately rounded on each side of emargination, but without a submarginal ridge, the lateral margins coarsely serrate on basal halves, entire on apical halves; eighth tergite slightly emarginate at apex, and finely, sparsely punctate, densely granulose, but not longitudinally carinate. Prosternum coarsely, densely punctate, sparsely clothed with moderately long, semierect, white hairs; anterior margin truncate, without a median lobe. Anterior femur with a rather large, obtuse tooth, which is dentate on outer margin. Anterior and middle tibiae arcuate; posterior tibia straight.

Length 12 mm., width 5 mm.

Redescribed from the female lectotype, No. 3434, in the Academy of Natural Sciences of Philadelphia.

Male.—Differing from the female in having the last visible sternite shorter, and deeply, semicircularly emarginate at apex, the eighth tergite more deeply emarginate at apex, the anterior tibia with a narrow, rounded dilation near apex, and the middle tibia broadly expanded toward apex.

Type locality.—Nevada, no definite locality.

DISTRIBUTION

From material examined:

CALIFORNIA: Wawona, June 11, 1904 (A. D. Hopkins). Onion Valley, reared (H. E. Burke). Fallen Leaf, August 1, 1915 (F. B. Herbert). Bray, April 23, 1914 (J. D. Riggs). Yosemite, May 1931 (E. G. Linsley).
IDAHO: Coeur d'Alene, May 14, 1920 (J. C. Evenden). Fort Sherman, March 1896 (J. D. Riggs).
NEVADA: No definite locality (type series).
OREGON: Cable Cove, July 27, 1911 (F. C. Craighead). Madera County, March 25 (R. Hopping). Fort Klamath (paratype). Crater Lake, July 4, 1939.

Also recorded by Chamberlin (1926) from Grant County, Oreg., during June and July, and from Weed and Yosemite, Calif.

Hosts.—This species has been reared from white fir (*Abies concolor* Lindley and Gordon) by Burke in California, and the adults have been taken by various collectors on western yellow pine (*Pinus ponderosa* Lawson) and Jeffrey pine (*Pinus jeffreyi* "Oreg. Com."). Chamberlin (1926) records it from lodgepole pine (*Pinus contorta* Loudon) and sugar pine (*Pinus lambertiana* Douglas), and (1917) states that the species probably breeds in these pines. Beer (1940) records it as reared from a limb of Douglas fir (*Pseudotsuga taxifolia* (LaMarck) Britton) in Oregon.

No variation worthy of note was observed in the specimens examined, except that the color on the underside of the body ranges from reddish purple to purplish black. The length is from 10.5 to 14.5 mm.

Horn described the species from California, Nevada, and Oregon, but there are no specimens from California in either the Horn or LeConte collections. Chamberlin (1926) selected the specimen from Nevada as the lectotype.

(64) CHRYSOBOTHRIS LUDIFICATA Horn

(Fig. 61; fig. 120, *B*)

Chrysobothris ludificata Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 88–89, pl. 3, figs. 80–84; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 118; Wickham, 1902, Iowa Univ. Lab. Nat. Hist. Bul. 5: 268; Skinner, 1902, Amer. Ent. Soc. Trans. 29: 40; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 180; Fletcher, 1907, Ent. Soc. Ontario Ann. Rpt. (1906) 37: 100; Woodworth, 1913, Guide to California Insects, p. 196; Burke, 1918, Jour. Econ. Ent. 11: 210; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 161; 1929, Pan-Pacific Ent. 5: 110, 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 639; Chamberlin, 1934, Pan-Pacific Ent. 10: 41, fig. 13; Tanner, 1934, Ent. Soc. Amer. Ann. 27: 46.

Male.—Moderately elongate, slightly convex above, moderately shining, piceous, with the depressed areas brownish cupreous; beneath purplish brown, with a faint bronzy tinge, and more strongly shining than above.

Head cupreous in front, greenish along margins and piceous on occiput, with a few narrow, irregular, smooth ridges on front, and a broad, smooth, longitudinal carina on occiput; front nearly flat, slightly uneven; surface coarsely, irregularly, confluently punctate, sparsely clothed with moderately long, erect, inconspicuous hairs; clypeus broadly, rather deeply, arcuately emarginate in

FIGURE 61.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris ludificata*.

front, broadly rounded on each side. Antenna bronzy green, slightly cupreous on apical segments, becoming broader toward apex; apical segments narrow, twice as wide as long, broadly rounded at outer margins; intermediate segments as wide as long, subtriangular; third segment slightly shorter than following two segments united.

Pronotum nearly twice as wide as long, slightly wider at base than at apex, widest along middle; sides nearly parallel and slightly sinuate at middle, arcuately converging toward apical angles, obliquely converging toward posterior angles; anterior margin broadly, arcuately emarginate, with a vague median lobe; base broadly, arcuately emarginate on each side, median lobe slightly produced and broadly rounded, disk slightly convex, uneven, with a broad, shallow, longitudinal, median depression, limited on each side by a broad, smooth, elevated callosity, and on each side midway between this callosity and lateral margin two irregular, smooth callosities; surface coarsely, deeply, irregularly, confluently punctate, clothed with a few short, inconspicuous hairs.

Elytra slightly wider than pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions round and very deep; humeral depressions elongate and moderately deep; surface glabrous, very uneven, deeply, densely, coarsely punctate in depressed areas. Each elytron with four smooth, longitudinal costae; first straight, strongly elevated from apex to base; second and third irregular, broadly interrupted, joined to each other and forming broad, irregular, smooth callosities; fourth barely indicated, subcrenulate, following outline of lateral margin.

Abdomen beneath sparsely, coarsely, irregularly fossulate-punctate, more densely punctate at sides of basal sternites, sparsely clothed with short, recumbent, inconspicuous hairs, without distinct lateral callosities, intervals obscurely granulose; last visible sternite deeply, broadly, arcuately emarginate at apex, with a small, serrate, submarginal ridge, lateral margins coarsely serrate; eighth tergite coarsely, densely punctate, with a small angular notch at apex, but not longitudinally carinate. Prosternum coarsely, sparsely punctate, clothed with a few inconspicuous hairs; anterior margin truncate, without a distinct median lobe. Anterior femur with a short, obtusely triangular tooth, which is distinctly dentate on outer margin. Anterior tibia strongly arcuate, with an obtusely angulated dilation near apex and more or less constricted behind the dilation; middle tibia slightly arcuate and slightly expanded toward apex; posterior tibia straight.

Length 11 mm., width 4.25 mm.

Redescribed from the male lectotype, No. 3435, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the front of the head brownish cupreous and more sparsely punctured, the antenna uniformly brownish cupreous, the last visible sternite more elongate, and more narrowly emarginate at apex, the eighth tergite rounded or slightly emarginate at apex, and more deeply, confluently punctured, and the anterior and middle tibiae slightly arcuate and unarmed near their apices.

Type locality.—Colorado, no definite locality.

DISTRIBUTION

From material examined:

ARIZONA: Flagstaff, July (H. F. Wickham, Barber and Schwarz). Williams and Bright Angel, June–July (Barber and Schwarz). Kaibab National Forest, August (H. F. Wickham). Grand Canyon, June 21, 1924 (G. Hofer). Prescott, June–July (H. F. Wickham, M. W. Blackman). Santa Catalina Mountains, reared (J. L. Webb). Carr Canyon, Huachuca Mountains, 9,000 feet, July–August (H. Skinner).

COLORADO: No definite locality (type). Ouray, 7,500 to 8,000 feet, July 1–15, 1897; Bailey, August 1890 (H. F. Wickham).

NEW MEXICO: Jemez Mountains, 9,000 feet, August 8, 1917 (J. Woodgate). Pecos National Forest, August 22–24, 1916 (C. Heinrich). Las Vegas Hot Springs, August (Barber and Schwarz). Beulah (H. Skinner). Coolidge (H. F. Wickham).

UTAH: Panguitch, July 2, 1907 (H. E. Burke). Alton, July 13, 1922; Bryce Canyon, August 5, 1922 (G. Hofer).

Also recorded in the literature from other localities in the above States. It has been recorded from California by different collectors, but the writer has not examined any specimens from that State, and the California record for the lectotype and paratype in the Academy of Natural Sciences of Philadelphia, given by Chamberlin (1926), is an error for "Col." The specimens from Kansas and South Dakota listed by Chamberlin (1926) as being in the United States National Museum could not be located. Fletcher (1907) records the species from Aweme, Ontario.

Hosts.—This species has been reared from piñon (*Pinus edulis* Engelmann) collected by J. L. Webb in the Santa Catalina Mountains, Ariz., and the adults have been collected on limber pine (*Pinus flexilis* James), blue spruce (*Picea pungens* Engelmann), and Douglas fir (*Pseudotsuga taxifolia* (LaMarck) Britton). Chamberlin (1926) records Rocky Mountain white oak (*Quercus utahensis* (De Candolle) Rydberg) as one of the hosts, but this may be an error, as this species seems to be restricted to coniferous trees. Burke (1918) records it as mining the bark and sapwood of dying and dead limbs, logs, and stumps of western yellow pine (*Pinus ponderosa* Lawson).

The color and sculpture on the dorsal surface of the body are rather constant. The clypeus is arcuately or angularly emarginate in front, and sometimes the pronotum is widest near the apex, with the sides obliquely converging posteriorly. The dilation on the anterior tibia of the male is slightly variable in size and shape, and the emargination at the apex of the last visible abdominal sternite of the female is wider in some specimens than in others. The length is from 9 to 15 mm.

(65) Chrysobothris quadrilineata LeConte

(Fig. 62; fig. 120, *C*)

Chrysobothris quadrilineata LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 233–234; Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 94–95, pl. 4, figs. 120–124; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 218; Cockerell, 1898, N. Mex. Agr. Expt. Sta. Bul. 28: 152; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 180; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 168; Tanner, 1928, Ent. Soc. Amer. Ann. 21: 274; Chamberlin, 1929, Pan-Pacific Ent. 5: 110; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 647; Chamberlin, 1934, Pan-Pacific Ent. 10: 40, fig. 21; Linsley and Ross, 1940, Pan-Pacific Ent. 16: 75.

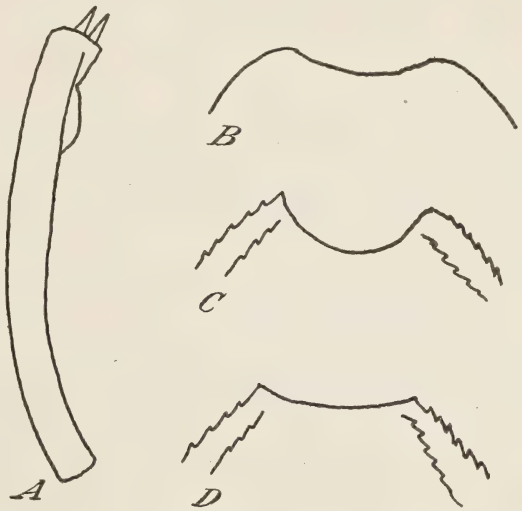

Figure 62.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris quadrilineata.*

Male.—Broadly elongate, strongly depressed above, piceous and strongly shining on smooth spaces, faintly bronzy in depressed punctured areas; beneath piceous, with a distinct purplish-cupreous reflection, and more strongly shining than above.

Head brownish cupreous, bronzy green on clypeus, with two small, smooth callosities on front, and a narrow, longitudinal carina on occiput, the carina slightly bifurcate on vertex; front nearly flat; surface coarsely, deeply, irregularly foveolate-punctate, transversely rugose behind clypeus, rather densely clothed with moderately long, recumbent, white hairs; clypeus broadly, shallowly, arcuately emarginate in front, arcuately rounded on each side. Antenna dark bronzy green, becoming piceous toward outer margins of segments, gradually narrowed to apex; intermediate segments compact, slightly wider than long, broadly truncate at outer margins; third segment subequal in length to following two segments united.

Pronotum twice as wide as long, wider at base than at apex, widest just behind middle; sides slightly sinuate at middle, arcuately converging toward apex and base; anterior margin deeply, arcuately emarginate, with a slightly rounded median lobe; base angularly emarginate on each side, median lobe strongly rounded, and subtruncate in front of scutellum; disk moderately convex, uneven, with a broad, deep, median sulcus, limited on each side by a broad, very sparsely punctured, slightly elevated, longitudinal space, and on each side midway between this space and the lateral margin another narrow, sinuate, elevated, longitudinal,

nearly smooth space; surface coarsely, deeply, confluently punctate between smooth spaces.

Elytra distinctly wider than pronotum, five-sixths longer than wide; sides parallel from humeral angles to just behind middle, then obliquely converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad, very deep; humeral depressions broad, moderately deep; surface glabrous, uneven, intervals between costae and smooth spaces coarsely, deeply, confluently punctate. Each elytron with four more or less distinct longitudinal costae; first straight, extending from apex to base, very narrow on apical half, broadly dilated on basal half; second narrow near apex, interrupted at apical third, then expanded into a wide, smooth space, becoming narrower and irregular on basal third; third narrow, broadly interrupted behind middle, expanded and joined to second near middle and at basal third; fourth barely indicated, extending along lateral margin from humerus to apex.

Abdomen beneath finely, deeply, rather densely, irregularly fossulate-punctate, sparsely clothed with very short, recumbent, white hairs, with more or less distinct lateral callosities, intervals indistinctly granulose; last visible sternite deeply, broadly, arcuately emarginate at apex, with a rather distinct, serrate, submarginal ridge, lateral margins coarsely serrate; eighth tergite subtruncate at apex, coarsely, deeply, confluently punctate, but not longitudinally carinate. Prosternum coarsely, densely, transversely rugose, densely clothed with long, semierect, white hairs, with a smooth, longitudinal, median line; anterior margin strongly, arcuately rounded at middle, with a broad, short, median lobe. Anterior femur with a large, acutely angular tooth, which is dentate on outer margin. Anterior and middle tibiae slightly arcuate, the former with a long, sinuate dilation at apex, posterior tibia straight.

Length 12 mm., width 5.5 mm.

Redescribed from the male type, No. 2700, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—Differing from the male in having front of head uniformly brownish cupreous, more sparsely punctured and more sparsely pubescent, antenna piceous, with a vague greenish reflection, last visible sternite slightly longer, and broadly subtruncate at apex, the eighth tergite broadly rounded at apex and more deeply punctate, prosternum coarsely, sparsely punctate, and very sparsely pubescent, anterior tibia unarmed at the apex, and middle tibia straight.

Type locality.—Santa Fe, N. Mex. (Type simply labeled with a dark-green disk.)

DISTRIBUTION

From material examined:

ARIZONA: No definite locality (Horn collection).
NEW MEXICO: Sante Fe, type series (Fendler). Mt. Capitan, August 29 (Bryant). Cloudcroft, September 5 (S. Shimek).

Also recorded in the literature from:

ARIZONA: Carr's Peak, Huachuca Mountains (Chamberlin 1926).
CALIFORNIA: Piñon Flats (Lindsley and Ross 1940).
NEVADA: Goldfield, Esmeralda County, 7,000 feet, July 27 (Chamberlin 1926).
NEW MEXICO: Gallinas and Water Canyons (Cockerell 1898). Jemez Mountains, August 4 (Chamberlin 1926).
UTAH: Zion National Park (Tanner 1928).

Hosts.—The larval habits are unknown, but adults were collected by Tanner (1928) around western yellow pine (*Pinus ponderosa* Lawson), and by Linsley and Ross (1940) on California juniper (*Juniperus californicus* Carrière).

No variation was observed in the few specimens examined except in size, the length ranging from 13 to 15 mm.

(66) Chrysobothris grandis Chamberlin

(Fig. 63)

Chrysobothris grandis Chamberlin, 1938, Pan-Pacific Ent. 14: 14–16, figs. 17–19.

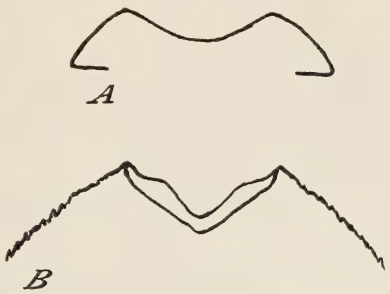

Figure 63.—Clypeus (*A*) and last visible abdominal sternite of the female (*B*) of *Chrysobothris grandis*.

Female.—Broadly elongate, feebly convex above, moderately shining, piceous on elevated smooth spaces, lilacinous in punctured depressed areas; beneath purplish brown, and more strongly shining than above.

Head purplish brown, with a narrow, smooth, longitudinal carina on occiput, and two small, smooth callosities on front; front nearly flat; surface coarsely, shallowly, irregularly, confluently punctate, sparsely clothed with short, erect, inconspicuous hairs; clypeus broadly, shallowly, arcuately emarginate in front, subtruncate on each side. Antenna uniformly purplish brown, slightly narrowed to apex; intermediate segments slightly wider than long, broadly rounded at outer margins; third segment slightly shorter than following two segments united.

Pronotum nearly twice as wide as long, narrower at apex than at base, widest along middle; sides arcuately converging at base and apex, parallel and sinuate at middle; anterior margin deeply, arcuately emarginate, without a distinct median lobe; base slightly, arcuately emarginate on each side, median lobe slightly produced and broadly rounded; disk slightly convex, uneven, with a shallow, longitudinal, median depression on apical half, limited on each side anteriorly by a broad, irregular, elevated, smooth space, and with a round, elevated, smooth callosity on each side at base, midway between middle and posterior angle; surface reticulate toward sides, densely, finely, irregularly punctate in depressed areas.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins finely serrate; basal and humeral depressions broad and deep; surface glabrous, finely, densely punctate between the elevated, smooth spaces. Each elytron with three more or less distinct, smooth costae; first rather strongly elevated, extending from base to apex, narrow and straight on apical half, broader and sinuate on basal half; second and third costae broadly interrupted, more or less joined to each other and first costa by irregular, elevated, smooth spaces.

Abdomen beneath sparsely, finely, irregularly punctate, sparsely clothed toward sides with short, semierect, white hairs, with indistinct lateral callosities, intervals obsoletely granulose; last visible sternite angularly emarginate at apex, longitudinally elevated on each side on basal half, but without a distinct submarginal ridge, lateral margins coarsely serrate except near apices; eighth tergite coarsely, deeply, confluently punctate, with a small angular notch at apex. Prosternum coarsely, densely punctate, sparsely clothed with short, erect, white hairs; anterior margin with a broad, very narrow, median lobe. Anterior femur with a broad, obtuse tooth, which is finely dentate on outer margin. Anterior tibia slightly arcuate; middle and posterior tibiae straight.

Length 17 mm., width 6.6 mm.

Redescribed from the female type in the collection of W. J. Chamberlin.

Male.—Unknown.

Type locality.—Lookout trail, 5,200 to 6,000 feet, Fall Mountain, Grant County, Oreg.

DISTRIBUTION

From material examined:

CALIFORNIA: Mutau Valley (near Griffin P. O.), Ventura County, June 2, 1904 (A. D. Hopkins).

OREGON: Lookout trail, 5,200 to 6,000 feet, Fall Mountain, Grant County, July 14, 1936, type (H. A. Scullen).

Host.—Hopkins collected the adult and a pupa in a badly worm-eaten, exposed root of a living Jeffrey pine (*Pinus jeffreyi* "Oreg. Com.").

Very little variation was observed in the two females examined. In the type the depressions are covered with a white efflorescence, which is absent in the other specimen. The median lobe of the anterior margin of the pronotum is exaggerated in Chamberlin's drawing (fig. 19). Chamberlin states that the prominently lobed prosternum readily separates the species from *californica*, but the lobe is very narrow, and the species could be easily mistaken for one without a median lobe on the prosternum, and the pronotum is not more than twice as wide as long, as stated by Chamberlin.

(67) CHRYSOBOTHRIS NIXA Horn

(Fig. 64; fig. 120, *D*)

Chrysobothris nixa Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 98–99, pl. 5, figs. 145–149; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 118; Woodworth, 1913, Guide to California Insects, pp. 194, 196; Chamberlin, 1917, Ent. News 28: 138; Burke, 1917, Jour. Econ. Ent. 10: 328–329; Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 193 (separate, p. 192); 1926, Cat. Buprestidae North Amer., p. 164; 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 643; Chamberlin, 1934, Pan-Pacific Ent. 10: 39, fig. 3.

FIGURE 64.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris nixa*.

Male.—Moderately elongate, slightly convex above, subopaque, uniformly piceous, with a faint cupreous reflection; beneath brownish cupreous, with distinct purplish and greenish tinges, bluish black on tarsi, more strongly shining than above.

Head uniformly bronzy green in front, becoming brownish cupreous on occiput, with an indistinct longitudinal carina on occiput, and two small, obsolete callosities on front; front flat; surface very finely, sparsely punctate with punctures distinctly separate on front, coarsely, confluently punctate on occiput and behind clypeus, sparsely clothed with long, erect, white hairs, intervals densely, distinctly granulose; clypeus broadly, shallowly, angularly emarginate in front, slightly rounded on each side. Antenna bronzy green basally, brownish cupreous and gradually narrowed to apex; intermediate segments not compact, subtriangular, distinctly wider than long, broadly rounded at outer margins; third segment one-third shorter than following two segments united.

Pronotum nearly twice as wide as long, slightly wider at base than at apex, widest along middle; sides arcuately converging at base and apex, nearly parallel along middle; anterior margin broadly, arcuately emarginate, without a distinct median lobe; base broadly, arcuately emarginate on each side, median lobe moderately produced, and subtruncate in front of scutellum; disk moderately convex, with a vague, longitudinal, median depression, a vague, transverse, postapical depression, and a broad, inconspicuous depression on each side near lateral margin; surface coarsely, densely, deeply punctate, confluently punctate at sides, and more or less rugose, sparsely clothed at sides with short, erect, inconspicuous hairs, intervals densely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, coarsely, densely punctate, transversely rugose at sides, intervals densely granulose. Each elytron with the first costa strongly elevated from apex to basal third; second and third costae obsolete, broadly interrupted; fourth costa barely indicated, following outline of lateral margin.

Abdomen beneath sparsely, coarsely, irregularly punctate, sparsely clothed with short, erect, white hairs, without distinct lateral callosities, intervals densely granulose; last visible sternite deeply, semicircularly emarginate at apex, without a distinct submarginal ridge, lateral margins slightly serrate; eighth tergite deeply, triangularly emarginate at apex, coarsely, sparsely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, densely clothed with long, erect, white hairs; anterior margin broadly rounded, with a distinct, narrow, median lobe. Anterior femur with a short, obtusely angulated tooth, which is dentate on outer margin. Anterior and middle tibiae arcuate, the former with a broad, elongate dilation at apex, and deeply constricted behind dilation; posterior tibia slightly sinuate.

Length 10.5 mm., width 4 mm.

Redescribed from the male lectotype, No. 3439, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the front of the head uniformly brownish cupreous, sometimes slightly greenish behind the clypeus, more sparsely, coarsely punctate, and sparsely pubescent, the antenna piceous, with a faint cupreous or bronzy tinge, the last visible sternite more narrowly emarginate at apex, the eighth tergite slightly emarginate at apex, and coarsely, confluently punctate, the prosternum sparsely punctured and sparsely pubescent, the anterior tibia unarmed at apex, and the middle tibia only slightly arcuate.

Type locality.—Western Nevada, no definite locality.

DISTRIBUTION

From material examined:

CALIFORNIA: Fallen Leaf Lake, July 14, 1925. Placerville, May to June, and reared (H. E. Burke, F. B. Herbert, and J. J. Sullivan). Mesquite, June 3, 1916 (C. H. Morton); reared (F. B. Herbert). Summerdale, July 3, 1906; Onion Valley, July 20, 1913 (H. E. Burke). Stanford University. Yosemite Valley, June 22, 1916. Carrville, Trinity County, July 5 (E. C. Van Dyke).

NEVADA: No definite locality (type series).
OREGON: No definite locality (A. Koebele).

Also recorded in the literature from:

CALIFORNIA: Miami; Azusa; Calaveras; and Weed, July (Chamberlin 1926).
OREGON: Josephine, June 11 (Chamberlin 1926).

Hosts.—This species has been reared from incense cedar (*Libocedrus decurrens* Torrey) by H. E. Burke, F. B. Herbert, and J. J. Sullivan in California, and the adults have been collected on this host by various collectors. Burke (1917) records it as mining the inner bark and wood of normal, injured, and dead trees, killing saplings and small trees. It is very common in felled incense cedar, and has been reared by F. B. Herbert from Monterey cypress (*Cupressus macrocarpa* Gordon). Van Dyke (1924) records collecting adults on western juniper (*Juniperus occidentalis* Hooker) in southern Oregon.

The sculpture and coloration on the dorsal surface of the body are rather constant, but in some of the specimens the punctured areas are more reddish cupreous than in others. The color on the front of the head in the males varies from uniformly reddish cupreous to bronzy green, frequently becoming brownish cupreous on the occiput. The clypeus is more shallowly emarginate in the lectotype than in most of the specimens examined, and frequently has a narrow notch at the middle of the emargination. The shape of the pronotum is quite variable, and the specimens are about equally divided between those having the sides parallel and sinuate at the middle, and those with the pronotum widest near apex, and the sides strongly, obliquely converging posteriorly. The depressions on the pronotum are more or less variable in shape, and occasionally there is a vague, smooth callosity on each side of the middle at the apical third. The abdominal sternites are usually without lateral callosities, but in a few specimens examined they were slightly indicated. The emargination at the apex of the last visible abdominal sternite in the female of this species is more variable than usual, and in most of the specimens it is rather deeply, narrowly emarginate, but in a few it is more broadly emarginate, and frequently has a slight transverse anteapical lamina. The length is from 9 to 14.5 mm.

The two specimens labeled "Cala." in the LeConte collection are probably the ones mentioned by Horn from Calaveras, Calif., in his original description.

(68) CHRYSOBOTHRIS MONTICOLA Fall

(Fig. 65; fig. 120, *E*)

Chrysobothris monticola Fall, 1910, N. Y. Ent. Soc. Jour. 18: 51–52, fig. 1g; Woodworth, 1913, Guide to California Insects, p. 196; Chamberlin, 1917, Ent. News 28: 136; Van Dyke, 1918, Ent. News 29: 57–58; Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 193 (separate, p. 192); 1926, Cat. Buprestidae North Amer., p. 164; 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 642; Chamberlin, 1934, Pan-Pacific Ent. 10: 39, fig. 2.

Male.—Moderately elongate, rather strongly depressed above, strongly shining uniformly piceous on the elevated, smooth spaces, brownish cupreous in the depressed, densely punctured areas; beneath uniformly purplish cupreous and strongly shining.

Head golden green in front, becoming cupreous on occiput, with two small callosities on front, and a smooth, longitudinal carina on occiput; front flat;

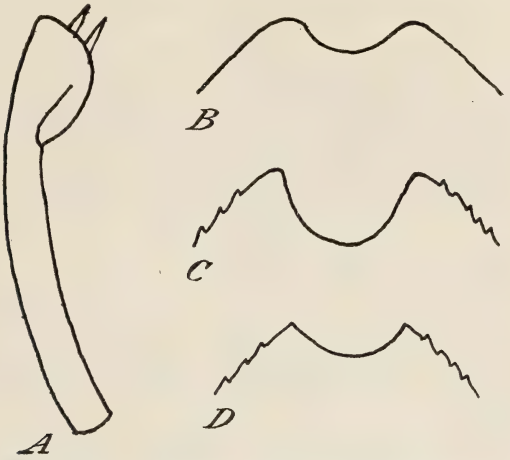

FIGURE 65.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris monticola*.

surface densely, coarsely, deeply, irregularly punctate, densely clothed with long, erect, inconspicuous hairs, intervals densely granulose; clypeus broadly, arcuately emarginate in front, slightly rounded on each side. Antenna cupreous, more greenish on basal segments, slightly narrowed to apex; intermediate segments about as long as wide, subtriangular, broadly rounded at outer margins; third segment one-third longer than fourth.

Pronotum nearly twice as wide as long, narrower at apex than at base, widest near apex; sides arcuately rounded at apex, strongly converging posteriorly, nearly parallel at middle; anterior margin broadly, arcuately emarginate, without a median lobe; base broadly, arcuately emarginate on each side, median lobe slightly produced and broadly rounded; disk slightly convex, uneven, with a broad, longitudinal, median depression, densely punctate on apical two-thirds and smooth at base, limited on each side on apical half by a broad, smooth, elevated space, and exterior to this space on each side two more or less connected, irregular callosities; surface between smooth spaces densely, irregularly punctate.

Elytra slightly wider than pronotum, twice as long as wide; sides parallel from humeral angles to apical third, then strongly, arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, uneven, with numerous rather large, irregular, smooth spaces, between which the surface is densely, finely punctate. Each elytron with four more or less distinct longitudinal costae; first distinct, parallel with sutural margin, narrow and strongly elevated apically, becoming broader at base; the other three more or less indistinct, sinuate, strongly interrupted by the numerous densely punctured areas and smooth spaces.

Abdomen beneath sparsely, finely fossulate-punctate, slightly rugose at sides of basal sternites, sparsely clothed at sides with short, recumbent, white hairs, intervals nearly smooth; intermediate sternites with a small, more or less distinct, smooth, lateral callosity on each side; last visible sternite semicircularly emarginate at apex, with a slight submarginal ridge, lateral margins coarsely, slightly serrate; eighth tergite rather broadly, shallowly emarginate at apex, sparsely, coarsely punctate, densely granulose, but not longitudinally carinate. Prosternum densely, finely punctate, densely clothed with long, erect, fine, white hairs, with a distinct, wide, short, median lobe in front. Anterior femur with a broad, obtuse tooth, which is distinctly dentate on outer margin. Anterior and middle tibiae strongly arcuate, the former armed with a rounded dilation at apex, slightly constricted behind dilation, the latter gradually broadened at apex; posterior tibia straight.

Length 15 mm., width 6 mm.

Redescribed from the male type in the collection of H. C. Fall.

Female.—Differing from the male in having the front of the head uniformly cupreous brown, more coarsely punctate, more sparsely pubescent, and the smooth callosities larger, the prosternum more coarsely punctate and sparsely pubescent, the antenna cupreous, the last visible sternite broadly, but not deeply, arcuately emarginate at apex, the eighth tergite coarsely, densely punctate, and the anterior tibia unarmed at apex.

Type locality.—San Jacinto Mountains, Calif.

DISTRIBUTION

From material examined:

ALBERTA: Banff, Cascade Mts., 7,000 to 8,000 feet, July 25, 1925 (Owen Bryant).
BRITISH COLUMBIA: Merritt, Midday Valley, June 1925 (K. F. Auden).
CALIFORNIA: Los Angeles County (D. W. Coquillett). Yosemite; Los Gatos (R. D. Hartman). Meyers, September 5, 1916; Placerville, May 12, 1918 (F. B. Herbert). San Jacinto Mountains, 6,000 feet, May 24, 1908, type (F. Grinnell, Jr.).
COLORADO: Long Peak, August (T. D. A. Cockerell). Estes Park, June 10, 1934 (E. B. Andrews). Lump Gulch, near Gilpin, July 27, 1934 (H. G. Rodeck). Glacier Lake, Boulder County, June 27, 1936 (Helen Rodeck).
IDAHO: Smith Ferry, August 21, 1916 (A. C. Burrill).
OREGON: Anthony Lake, Blue Mountains, 7,100 feet, August 6, 1929 (H. A. Scullen).
WYOMING: Yellowstone National Park, August 2, 1907 (W. Robinson).

Also recorded in the literature from:

CALIFORNIA: California Sierras, above Lake Tahoe, and San Bernardino Mountains (Fall 1910). Weed, July–August (Chamberlin 1917). Fallen Leaf Lake, August; Green Valley, 8,000 feet, August 6; Tallac, July; Sierra Madre, June; Humboldt County, June 19 (Chamberlin 1926).
OREGON: Warner Mountains, Lake County, June 19 (Chamberlin 1925).

Hosts.—Fall (1910) mentions collecting an adult in its burrow in the dead twig of western yellow pine (*Pinus ponderosa* Lawson), and Chamberlin (1917) records the species as breeding in lodgepole pine (*Pinus contorta* Loudon). Adults have been examined that were collected on western white pine (*Pinus monticola* D. Don.) and Jeffrey pine (*Pinus jeffreyi* "Oreg. Com.").

The color in the depressed areas on the upper surface of the body varies from bronzy green through brownish cupreous to lilacinous, and on freshly collected specimens the surface is more or less covered with a white efflorescence. The clypeus is angularly or arcuately emarginate in front, and sometimes in the males the head is more greenish toward the clypeus. Occasionally the interior margin of the pronotum is slightly lobed at the middle. The length is from 12 to 15 mm.

The specimens from Colorado, Wyoming, and Alberta differ from the typical specimens from California in having the dorsal surface of the body smoother and the sculpture more irregular, the smooth spaces on the elytra narrower and not so conspicuous, and the dilation on the anterior tibia of the male more elongate and not so broadly rounded. The male genitalia are a little more broadly rounded at the sides in some specimens.

(69) Chrysobothris caurina Horn

(Fig. 66; fig. 120, *F*)

Chrysobothris caurina Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 92, pl. 4, figs. 105–109; Wickham, 1899, Ent. News 10:199; 1902, Iowa Univ. Lab. Nat. Hist. Bul. 5: 268; Fall, 1910, N. Y. Ent. Soc. Jour. 18: 50, fig. 1e; Woodworth, 1913, Guide to California Insects, p. 195; Gibson, 1914, Ent. Soc. Ontario Ann. Rpt. (1913) 44: 116; Chamberlin, 1917, Ent. News 28: 135–136; Garnett, 1918, Ent. Soc. Amer. Ann. 11: 92; Van Dyke, 1918, Ent. News 29: 56, 57; Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 192 (separate, p. 191); 1926, Cat. Buprestidae North Amer., p. 142; 1929, Pan-Pacific Ent. 5:115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 614; Chamberlin, 1934, Pan-Pacific Ent. 10: 39, fig. 1; Lange, 1937, Pan-Pacific Ent. 13: 173.

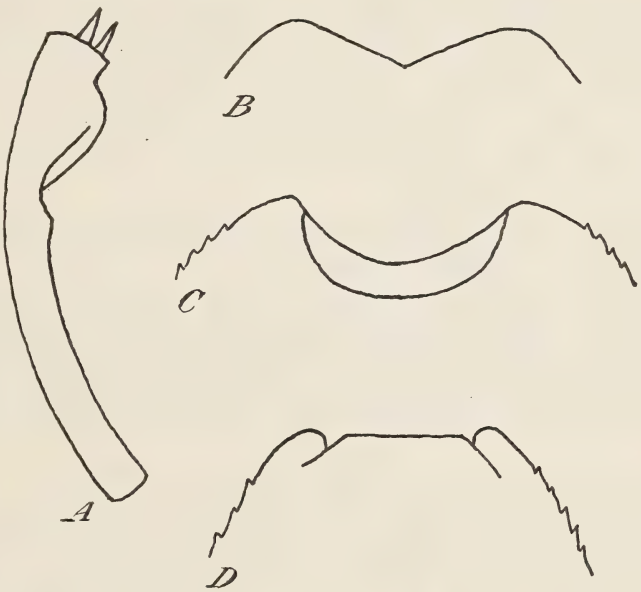

Figure 66.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris caurina*.

Male.—Moderately elongate, moderately convex above, rather strongly shining, uniformly piceous, with a vague purplish reflection; beneath purplish cupreous, with a distinct bronzy tinge (legs more or less greenish), and more strongly shining than above.

Head bronzy green in front, piceous on occiput, with a smooth longitudinal carina on occiput, and two small callosities on front; front nearly flat; surface coarsely, densely punctate, sparsely clothed with long, erect, inconspicuous hairs, the intervals densely, finely granulose; clypeus broadly, rather deeply, angularly emarginate in front, arcuately rounded on each side. Antenna bronzy green, gradually narrowed to apex; intermediate segments moderately compact, slightly wider than long, broadly rounded at outer margins; third segment nearly as long as the following two segments united.

Pronotum nearly twice as wide as long, slightly wider at base than at apex, widest along middle; sides parallel and slightly sinuate along middle, arcuately converging near base and apex; anterior margin sightly sinuate, with an obsolete, broadly rounded median lobe; base shallowly, arcuately emarginate on each side, median lobe slightly produced, and subtruncate in front of scutellum; disk moderately convex, slightly uneven, with a broad, shallow,

median sulcus, and a few irregular, smooth callosities; surface densely punctate in median sulcus, coarsely, irregularly punctate on each side, sparsely clothed with a few rather short, recumbent hairs, intervals densely granulose.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal and humeral depressions broad and shallow; disk moderately convex and uneven; surface glabrous, with finely, densely punctured spaces of irregular shape, and broad, smooth spaces, and with reticulating lines near sides. Each elytron with four more or less distinct longitudinal costae; first distinct, extending from apex to near base; second and third indistinct and more or less interrupted; fourth represented by a fine line following outline of lateral margin.

Abdomen beneath finely, sparsely, irregularly punctate, sparsely clothed with short, semierect, whitish hairs, without distinct lateral callosities, intervals densely granulose; last visible sternite deeply, semicircularly emarginate at apex, without a submarginal ridge, lateral margins slightly serrate; eighth tergite deeply, angularly emarginate at apex, densely granulose, coarsely, sparsely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, transversely rugose, densely clothed with long, erect, whitish hairs; anterior margin slightly arcuate, with a vague median lobe. Anterior femur with a short, obtuse tooth, which is slightly dentate on outer margin. Anterior tibia strongly arcuate, with a broad dilation at apex and a deep notch behind the dilation; middle tibia arcuate, rather abruptly, broadly dilated at apex; posterior tibia straight.

Length 11.5 mm., width 5 mm.

Redescribed from the male lectotype, No. 3436, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the front of the head slightly more convex and uniformly brownish cupreous, the antenna brownish cupreous, the last visible sternite with a small emargination at apex, which is limited at middle by a distinctly elevated, transverse carina or plate, and with an obsolete submarginal ridge, the eighth tergite rounded at apex and more coarsely punctate, the prosternum sparsely punctate and more sparsely pubescent, and the anterior and middle tibiae slightly arcuate and unarmed at apices.

Type locality.—Nevada, no definite locality.

Distribution.—Material has been examined from various localities in the following States: Arizona, California, Colorado, Idaho, Nevada, Oregon, Utah, Washington, and Wyoming. The species is also recorded in the literature by Gibson (1914) from Quamichan Lake, British Columbia. Chamberlin (1926) records the holotype from Arizona, but this is an error, as Horn did not have any specimens from that State when he described the species.

Hosts.—Adults have been reared from sugar pine (*Pinus lambertiana* Douglas), twigs of western yellow pine (*Pinus ponderosa* Lawson), and from main trunks and branches of Jeffrey pine (*Pinus jeffreyi* "Oreg. Com."). Adults have been examined that were collected on mountain hemlock (*Tsuga mertensiana* (Bongard) Sargent), and white fir (*Abies concolor* Lindley and Gordon). Chamberlin (1926) records western larch (*Larix occidentalis* Nuttall) and Douglas fir (*Pseudotsuga taxifolia* (LaMarck) Britton) as hosts for this species.

The color and sculpture on the upper surface of the body are rather constant. The sides of the pronotum are usually sinuate and parallel along the middle, but occasionally specimens are found with the pronotum widest near the apex, and the sides converging from near the apices to the posterior angles. The emargination of the

clypeus is more or less variable in depth, and in the female the emargination at the apex of the last visible abdominal sternite is slightly variable in shape. In some of the specimens examined the lateral callosities on the abdominal sternites are barely indicated. The lectotype has the anterior margin of the prosternum truncate, without any indications of a median lobe, but in other specimens the anterior margin is arcuately rounded, with a broad, very short, median lobe.

The length is from 10 to 13 mm.

Horn (1886) states in his table that there is "a well marked transverse ridge in front of the notch" at the apex of the last visible abdominal sternite of the female. Fall (1910) describes this as follows:

> This apical ridge or carina consists of the free edge of the terminal portion of the submarginal serrate ridge, leaving the apical portion, where it cuts across the bottom of the emargination, smoothly outlined and a little deflexed, and is best seen when looked at from behind and nearly in the axial line of the body.

(70) Chrysobothris blanchardi Horn

(Fig. 67; fig. 121, *A*)

Chrysobothris blanchardi Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 93–94, pl. 4, figs. 115–119; Blanchard, 1889, Ent. Amer. 5: 31; Ulke, 1902, U. S. Natl. Mus. Proc. 25: 21; Felt, 1906, N. Y. State Mus. Mem. 8: 751; Blatchley, 1910, Coleoptera of Indiana, pp. 790–791; Frost, 1916, Canad. Ent. 48: 386; Blackman and Stage, 1918, N. Y. State Col. Forestry Tech. Pub. 10: 81–82, pl. 8, figs. 23–25; Knull, 1920, Ent. News 31: 6; 1922, Canad. Ent. 54: 83; 1925, Ohio State Univ. Studies 2 (2): 28, 32–33; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 140; Leonard, 1928, N. Y. (Cornell) Agr. Expt. Sta. Mem. 101: 360; Chamberlin, 1934, Pan-Pacific Ent. 10: 40, fig. 19; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 612.

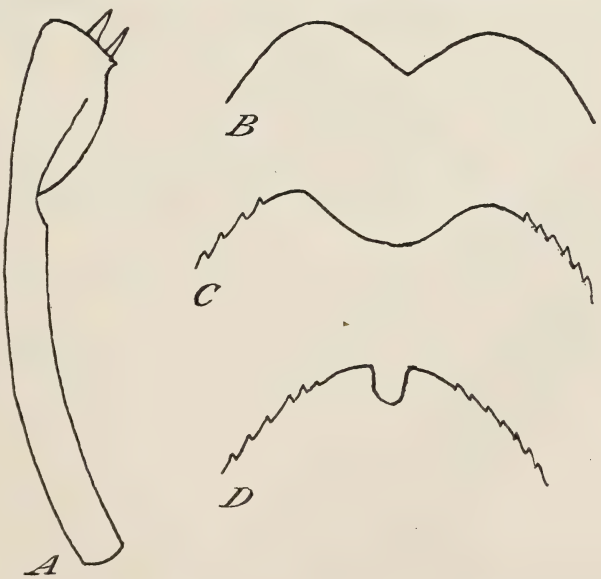

Figure 67.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris blanchardi*.

Male.—Moderately elongate, rather strongly depressed above, piceous and strongly shining on elevated spaces, bronzy cupreous and moderately shining in depressed areas; beneath purplish brown, with a distinct bronzy-green reflection in certain lights, and more strongly shining than above.

Head bright bronzy green, becoming cupreous on occiput, with a rather broad, smooth, longitudinal carina on occiput, and two small, round, smooth callosities on front; front flat; surface coarsely, confluently punctate, sparsely clothed with long, erect, inconspicuous hairs, intervals finely granulose; clypeus broadly, deeply, angularly emarginate in front, broadly rounded on each side. Antenna uniformly bright bronzy green, gradually narrowed to apex; intermediate segments not compact, as long as wide, subtruncate at outer margins; third segment nearly as long as following two segments united.

Pronotum nearly twice as wide as long, narrower at apex than at base, widest near apical fourth; sides strongly, arcuately converging near apical angles, subparallel at middle, arcuately converging posteriorly; anterior margin broadly, arcuately emarginate, without a median lobe; base shallowly, arcuately emarginate on each side, median lobe moderately produced, and narrowly subtruncate in front of scutellum; disk slightly convex, uneven, with an obscure, broad, densely punctured, median sulcus, limited on each side by a slightly elevated, less densely punctured space, and with a more or less distinct, oblique, sparsely punctured space on each side toward lateral margin; surface coarsely, deeply, irregularly punctate, clothed with a few inconspicuous hairs, intervals obsoletely granulose.

Elytra distinctly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately rather broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions broad and shallow; disk slightly convex; surface glabrous, rather coarsely, densely, irregularly punctate in the depressions. Each elytron with three more or less distinct, longitudinal costae; first strongly elevated from apex to in front of middle, then extending to base into an irregular, smooth space; second and third strongly interrupted, forming irregular, narrow, smooth spaces, and with an obliquely placed, densely punctured fovea at apical third between first and third costae, and a smaller one near middle interrupting second costa.

Abdomen beneath finely, sparsely, irregularly punctate, sparsely clothed with short, semierect, inconspicuous hairs, intervals obsoletely granulose; sternites smooth along anterior and posterior margins, without lateral callosities; last visible sternite deeply, arcuately emarginate at apex, with an indistinct submarginal ridge on each side at basal half, lateral margins coarsely serrate; eighth tergite deeply, angulately emarginate at apex, finely granulose, coarsely, densely punctate, but not longitudinally carinate. Prosternum coarsely, confluently punctate, rather densely clothed with long, erect, inconspicuous, white hairs; anterior margin with a wide, short, median lobe. Anterior femur with a large, moderately obtuse tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae strongly arcuate, the former with a broadly rounded dilation on apical third, the latter gradually expanded near apex; posterior tibia nearly straight.

Length 11.5 mm., width 4.75 mm.

Redescribed from the male lectotype, No. 3437, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the head and antenna uniformly reddish cupreous, the prosternum sparsely, coarsely punctate, and sparsely pubescent, the last visible sternite deeply, narrowly notched at apex, the eighth tergite broadly rounded at apex, and coarsely, confluently punctate, and the tibiae unarmed at apices.

Type locality.—Tyngsboro, Mass.

DISTRIBUTION

From material examined:

INDIANA: Millers, July 12, 1915.
MAINE: Paris, June 30 to July 19 (C. A. Frost).
MANITOBA: Victoria Beach, August 5, 1923 (J. B. Wallis).
MASSACHUSETTS: Tyngsboro, July 13 to August 10, type series (Fred Blanchard).

Newton, September 1911; Framingham, June 29, 1926; Monterey, July 9, 1919 (C. A. Frost).
NEW BRUNSWICK: Penobsquis, July 31, 1926 (C. A. Frost).
NEW YORK: West Point, June 26 to September 15, 1912 (W. Robinson).
QUEBEC: Ft. Coulonge, June–August (J. I. Beaulne).
SOUTH DAKOTA: Buffalo Gap (A. E. Hall).

Also recorded in the literature from:

DISTRICT OF COLUMBIA: Washington (Ulke 1902).
INDIANA: Lake and Knox Counties (Blatchley 1910).
MICHIGAN: Lake Superior region (Horn 1886).
NEW MEXICO: Capitan, April (Chamberlin 1926).
PENNSYLVANIA: Hogestown, reared; Rockville, July 21; Endeavor, July 30; Charter Oak (Knull 1920, 1922).
TEXAS: Davis Mountains, April 10 (Horn 1886).

Hosts.—This species has been reared from the bark of dead pitch pine (*Pinus rigida* Miller), northern white pine (*Pinus strobus* Linnaeus), Virginia pine (*Pinus virginiana* Miller), and tamarack (*Larix laricina* (DuRoi) Koch).

The color is rather constant, except on the head, which varies from bright green to bronzy green. In most specimens examined the first costa on each elytron is distinct posteriorly, but in a few specimens it is rather indistinct and more or less interrupted. The sides of the pronotum are usually subparallel at the middle, but in a few specimens examined the sides are strongly converging from near the apices to the posterior angles. The clypeus is either triangularly or arcuately emarginate in front. Horn (1886) separates this species from *californica* on account of its having a submarginal serrate ridge on the last visible abdominal sternite, but this species can hardly be considered as having a submarginal ridge, as this character is rather variable; at most, it is only indicated on each side of the last visible sternite at the basal half, whereas in some specimens it is scarcely noticeable. The length is from 10 to 13.5 mm.

(71) CHRYSOBOTHRIS CANADENSIS Chamberlin

(Fig. 68; fig. 121, *B*)

Chrysobothris canadensis Chamberlin, 1934, Pan-Pacific Ent. 10: 37, fig. 12.

Male.—Broadly elongate, strongly flattened above, moderately shining, brownish black, with a faint purplish reflection on elevated, smooth spaces, cupreous and bronzy green in depressions; beneath purplish brown, with a distinct bronzy-green reflection in certain lights, and more strongly shining than above.

Head bronzy green, with a broad, short, longitudinal carina on occiput, and two small, smooth callosities on front; front slightly convex; surface coarsely, deeply foveolate-punctate, rather densely clothed with moderately long, erect, inconspicuous hairs, intervals finely granulose; clypeus broadly, deeply, angularly emarginate in front, obliquely subtruncate on each side. Antenna bronzy green, slightly cupreous, gradually narrowed to apex; intermediate segments not compact, as long as wide, broadly subtruncate at outer margins; third segment distinctly shorter than following two segments united.

Pronotum nearly twice as wide as long, wider at base than at apex, widest along middle; sides parallel along middle, arcuately converging at base and apex; anterior margin arcuately emarginate, without a distinct median lobe; base slightly, arcuately emarginate on each side, median lobe slightly produced, and narrowly truncate in front of scutellum; disk slightly convex, uneven, with a longitudinal, median sulcus extending from base to apex, two broad, irregular depressions on each side, one near anterior margin and the other near base, and with numerous small, irregular, smooth spaces; surface coarsely, deeply, irregularly punctate between the smooth elevations.

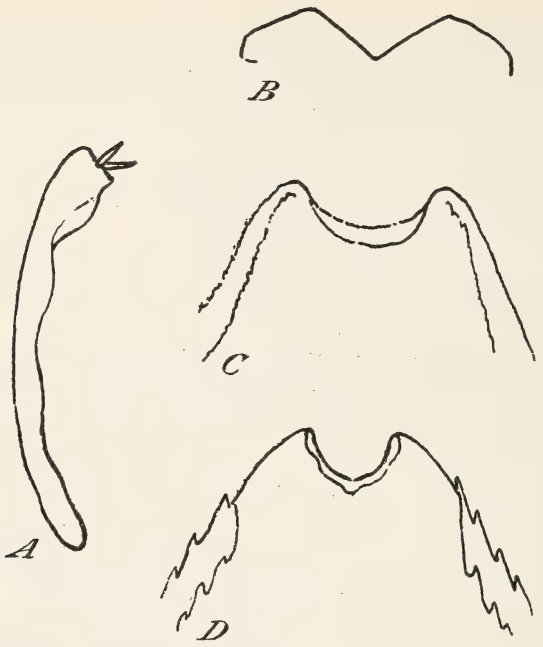

FIGURE 68.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris canadensis*.

Elytra distinctly wider than pronotum, nearly twice as long as wide, widest behind middle; sides sinuate and slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins slightly serrate posteriorly; basal depressions broad and very deep; humeral depressions broad and shallow; surface glabrous, densely, irregularly punctate between smooth elevations. Each elytron with the first costa sinuate, rather strongly elevated from apex to basal third, the other costae broadly interrupted and represented by irregular, narrow, smooth spaces.

Abdomen beneath coarsely, rather densely, irregularly punctate, clothed with a few short, recumbent, inconspicuous hairs, without distinct lateral callosities, intervals finely granulose; last visible sternite deeply, broadly, arcuately emarginate at apex, deeply depressed along lateral margins basally and with a vague submarginal ridge on basal half, lateral margins coarsely serrate; eighth tergite coarsely, sparsely, irregularly punctate, finely granulose, not longitudinally carinate, upper margin slightly, broadly emarginate at apex. Prosternum coarsely, confluently punctate, densely clothed with long, erect, white hairs, without a distinct median lobe. Anterior femur with a short, obtuse tooth, which is indistinctly dentate on outer margin. Anterior tibia arcuate, with a rounded dilation at apex, strongly constricted behind dilation; middle and posterior tibiae gradually dilated toward apex, the former arcuate and the latter straight.

Length 15 mm., width 6.6 mm.

Female.—Differing from the male in having the head uniformly purplish brown, more sparsely punctured and with the pubescence shorter, the antenna purplish brown, slightly bronzy green toward apex, the last visible sternite with a small semicircular notch at apex, the eighth tergite more densely, coarsely punctate, prosternum more sparsely punctured and less densely pubescent, and the anterior tibia unarmed at apex.

Redescribed from the male type from Waterton, Alberta, and female allotype from Banff, in the collection of W. J. Chamberlin.

Type locality.—Banff, Alberta, Canada.

DISTRIBUTION

From material examined:

ALBERTA: Waterton, July 17; Banff, July 19 to August 8, type series (F. S. Carr).
BRITISH COLUMBIA: Merritt, Midday Valley, June 1924 (K. F. Auden). Field, August 5, 1921 (E. M. Walker). Salmon Arm, June 1928 (H. B. Leech).
CALIFORNIA: No definite locality (Bowditch coll.).
WYOMING: Yellowstone National Park, July 30 (Hubbard and Schwarz).

Also recorded by Chamberlin in his description from the following localities:

ALBERTA: Medicine Hat (F. S. Carr).
OREGON: Strawberry Mountains, Grant County, 8,600 feet, "which differs but little from the typical form." (This may be *vulcanica.*)

Host.—Unknown.

Very little variation was observed in the few specimens examined. The color in the depressed areas on the dorsal surface of the body varies from bronzy green to cupreous and the smooth callosities are sometimes absent on the front of the head. The third segment of the antenna is slightly variable in length, occasionally being subequal in length to the following two segments united. The length is from 15 to 17 mm.

Chamberlin described the species from six specimens, two males and four females. This may be the same as *vulcanica* LeConte, but since the male of that species is unknown, it seems advisable to retain the two forms as separate species, at least until more material is available for study and both sexes of *vulcanica* can be associated. The female type of *vulcanica* differs from the female allotype of *canadensis* only in having the clypeus arcuately emarginate in front, the sides of the pronotum arcuately rounded, and the last visible abdominal sternite broadly rounded at the apex. In case these two species should prove to be identical, *vulcanica* has priority.

(72) CHRYSOBOTHRIS CALIFORNICA LeConte

(Fig. 69; fig. 121, *C*)

Chrysobothris californica LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 255; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90; Horn, 1883, Amer. Ent. Soc. Trans. 10: 287 (identification?); 1886, Amer. Ent. Soc. Trans. 13: 93, 120, pl. 4, figs. 110–114 (part); Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 208; Blaisdell, 1892, Insect Life 5: 33 (not *californica*); Fall, 1894, Ent. News 5: 98 (=*monticola*); Cockerell, 1898, N. Mex. Agr. Expt. Sta. Bul. 28: 152; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 117 (part *monticola*); Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 180; Wright and Coolidge, 1908, Ent. News, 19: 67; Fall, 1910, N. Y. Ent. Soc. Jour. 18: 46, 47–48, fig. 1a; Woodworth, 1913, Guide to California Insects, pp. 194, 195; Chamberlin, 1917, Ent. News 28: 135; 1926, Cat. Buprestidae North Amer., p. 141 (part); 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 613 (part); Chamberlin, 1934, Pan-Pacific Ent. 10: 42, fig. 24; Lange, 1937, Pan-Pacific Ent. 13: 173.

Some of these records probably apply to misidentified specimens.

Male.—Moderately elongate, strongly depressed above, moderately shining, piceous on the smooth spaces, purplish cupreous in the densely punctured, depressed areas; beneath purplish, with distinct greenish and bluish reflections in different lights, and more strongly shining than above.

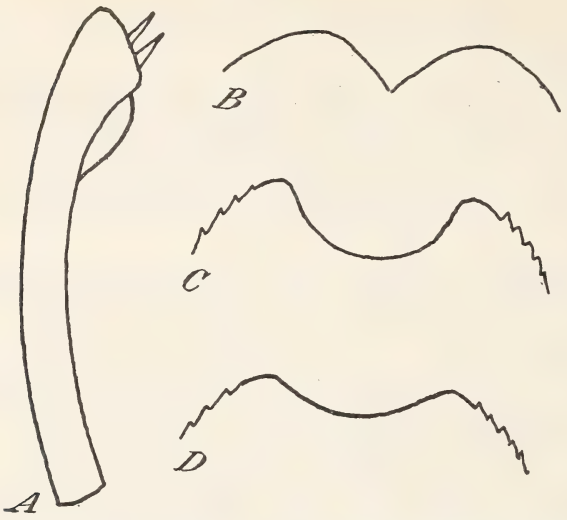

FIGURE 69.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris californica.*

Head bronzy cupreous, with two small, elongate, smooth callosities on front, and a broad, smooth, longitudinal carina on occiput; front nearly flat; surface coarsely, deeply, confluently punctate, sparsely clothed with long, semierect, inconspicuous hairs; clypeus broadly, deeply, angularly emarginate in front, arcuately rounded on each side. Antenna uniformly bronzy, slightly narrowed to apex; intermediate segments subtriangular, as long as wide, broadly rounded at outer margins; third segment nearly as long as following two segments united.

Pronotum two-thirds wider than long, slightly narrower at apex than at base, widest along middle; sides slightly sinuate and nearly parallel at middle, arcuately converging posteriorly and anteriorly; anterior margin broadly, arcuately emarginate, with a broad, vague, median lobe; base broadly, arcuately emarginate on each side, median lobe strongly produced, and broadly rounded; disk rather strongly convex, uneven, narrowly depressed on each side along lateral margin, with a broad, longitudinal, densely punctured, median depression, limited on each side on apical two-thirds by a broad, irregular, elevated, smooth callosity, and on each side midway between this callosity and lateral margin two small, irregular, smooth callosities; surface coarsely, deeply, irregularly, confluently punctate between smooth callosities.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad, very deep; humeral depressions broad, moderately deep; surface glabrous, uneven, finely, densely punctate between costae and smooth, elevated spaces, which are more or less connected to costae. Each elytron with three more or less distinct, longitudinal costae; first distinct, slightly sinuate, extending along sutural margin from apex to base; second straight, rather distinct, broadly interrupted by punctured spaces; third irregular, barely indicated, and broadly interrupted.

Abdomen beneath coarsely, rather densely, irregularly fossulate-punctate, sparsely clothed with short, recumbent, white hairs, and each sternite with an obsolete, smooth, lateral callosity on each side; last visible sternite deeply, semicircularly emarginate at apex, without a submarginal ridge, lateral margins slightly serrate; eighth tergite deeply, densely, coarsely punctate, densely granulose, but not longitudinally carinate, upper margin angularly emarginate at apex. Prosternum coarsely, confluently punctate, densely clothed with long, erect, white hairs, narrowly, transversely depressed along anterior margin, without a median lobe in front. Anterior femur with a broad, obtuse tooth, which is slightly dentate on outer margin. Anterior and middle tibiae strongly arcuate, the former with a long, sinuate dilation, but not constricted behind dilation; posterior tibia straight.

Length 17 mm., width 7.5 mm.

Redescribed from the male type, No. 2698, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—Differing from the male in having the antenna uniformly brownish cupreous, the last visible sternite more elongate, and broadly, shallowly, arcuately emarginate at apex, the eighth tergite more coarsely punctate, the prosternum sparsely punctate and sparsely pubescent, the anterior tibia slightly arcuate and unarmed at apex, and the middle tibia straight.

Type locality.—California, no definite locality.

DISTRIBUTION

From material examined:

CALIFORNIA: No definite locality, type (Andrew Murray). Confidence, August 20, 1919, reared (R. D. Hartman). Northfork, May 16, 1928 (A. Wagner). Yosemite, September 1914 (J. J. Sullivan).

Also recorded in the literature from the following localities, but some of these records may not refer to this species, as specimens have been so often misidentified in most collections:

CALIFORNIA: Castella, and Nevada County (Chamberlin 1917). San Diego County (Blaisdell 1892) (not this species). Southern Sierras and San Bernardino Mountains (Fall 1894, 1901) (this is *monticola*). Placer County, near Towle, Dutch Flat, and Alta (Wright and Coolidge 1908). Lassen National Forest, 5,500 to 6,500 feet, June (Lange 1937).
NEVADA: No definite locality (Horn 1886) (not this species).
NEW MEXICO: Coolidge and Santa Fe, 6,975 feet (Cockerell 1898) (identification?)

Hosts.—This species has been reared from western yellow pine (*Pinus ponderosa* Lawson) collected at Confidence, Calif., by R. D. Hartman. The larva mines in and under the bark, and pupates in the outer wood. Lange (1937) records it in the wood of trunks and branches of Jeffrey pine (*Pinus jeffreyi* "Oreg. Com."). Blaisdell (1892) reports it as extremely injurious to apple trees, but Chamberlin (1926) examined these specimens and found that they were not *californica*.

The sculpture on the dorsal surface of the body is rather constant, but the specimens are somewhat variable in shape, and the color in the depressed areas on the dorsal surface varies from purplish cupreous to brownish cupreous. In a few specimens examined the clypeus is narrowly notched at the middle of the emargination, and the pronotum is widest at the basal fourth. The length is from 15 to 17 mm.

LeConte (1859) described the species from a single male collected in California by Andrew Murray. Horn (1886) had a number of species confused under *californica*, and his redescription has caused much confusion, and at least in part applies to *monticola* Fall. He placed it in the group with lobed prosternum, but the type is without a median lobe, and the dilation on the anterior tibia of the male is incorrectly described and figured, as is also the clypeus. He also suppressed *vulcanica* LeConte as a small form of *californica*, but this is not correct, as *vulcanica* seems to be a valid species.

(73) CHRYSOBOTHRIS VULCANICA LeConte

Chrysobothris vulcanica LeConte, 1861, Acad. Nat. Sci. Phila. Proc. [13]: 346; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1428; Crotch, 1873, Acad Nat. Sci. Phila. Proc. [25]: 90; Horn, 1883, Amer. Ent. Soc. Trans. 10: 287; Woodworth, 1913, Guide to California Insects, p. 196.

Chrysobothris californica Horn, 1886, Amer. Ent. Soc. Trans. 13: 93, 120 (part); Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 208 (part); Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 191 (separate, p. 190) (part); 1926, Cat. Buprestidae North Amer., p. 141 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 613 (part).

Female.—Broadly elongate, strongly flattened above, rather strongly shining, brownish black on the smooth elevations, slightly cupreous in the depressions; beneath purplish, with a slight greenish reflection in certain lights, and more strongly shining than above.

Head purplish, with a short, broad, longitudinal, smooth carina on occiput; front nearly flat; surface coarsely, irregularly, confluently punctate, with numerous irregular, elevated, smooth spaces, sparsely clothed with short, inconspicuous hairs; clypeus broadly, arcuately emarginate in front, broadly rounded on each side. Antennae missing on type.

Pronotum twice as wide as long, slightly wider at base than at apex, widest along middle; sides slightly, arcuately rounded and somewhat sinuate; anterior margin strongly, arcuately emarginate, with a vague, broad, median lobe; base shallowly, broadly emarginate on each side, median lobe slightly produced and broadly rounded; disk moderately convex, uneven, with a vague, longitudinal, median depression, limited on each side at apical half by a broad, irregular, smooth callosity; surface with numerous small, irregular, smooth rugae, intervals densely, irregularly punctate.

Elytra distinctly wider than pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins slightly serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, densely, finely, irregularly punctate, with numerous irregular, elevated, smooth spaces, the first costa on each elytron rather distinct and elevated on apical third.

Abdomen beneath rather densely, finely punctate, sparsely clothed with short, recumbent, inconspicuous hairs, without distinct lateral callosities, intervals nearly smooth; last visible sternite broadly rounded at apex, without a submarginal ridge, lateral margins crenulate; eighth tergite vaguely emarginate at apex, coarsely, densely punctate, not longitudinally carinate. Prosternum coarsely, densely punctate, punctures transversely confluent, nearly glabrous; anterior margin slightly sinuate, without a distinct median lobe. (Anterior, posterior, and left middle legs missing.)

Length 16.5 mm., width 7 mm.

Redescribed from the female type, No. 2699, in the Museum of Comparative Zoology, Cambridge, Mass.

Male.—Unknown.

Type locality.—"East of Fort Colville," Oreg., type simply labeled with a dark-blue disk.

Distribution.—The only specimen examined which can be considered as this species is the female type, labeled with a dark-blue disk in the LeConte collection, and placed as No. 4 under *californica* by George Horn.

Host.—Unknown.

LeConte described the species from material collected by George Gibbs, who was connected with the Northwest Boundary Commission. Horn (1886) placed this species as a synonym of *californica*, stating that it is a smaller form, but his statement is incorrect, for *vulcanica* is quite distinct from *californica*. Fall (1910) pointed out that specimen No. 5 under *californica* in the LeConte collection is probably *vulcanica*, but that specimen has the last visible abdominal sternite deeply, narrowly emarginate at the apex, and seems to be *canadensis*. The tip of the last visible abdominal sternite of the type of *vulcanica* seems to be more or less deformed, and is more or less rounded when seen from the underside of the body, but when viewed from the end the tip seems to be bent upward and slightly emarginate.

(74) Chrysobothris woodgatei Champlain and Knull

(Fig. 70; fig. 121, *D*)

Chrysobothris woodgatei Champlain and Knull, 1922, Ent. News 33: 144–145; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 177; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 658; Chamberlin, 1934, Pan-Pacific Ent. 10: 40, fig. 20; 1938, Pan-Pacific Ent. 14: 15–16.

Figure 70.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris woodgatei*.

Male.—Broadly elongate, moderately convex above, piceous and strongly shining on the elevated spaces, brownish cupreous and subopaque in the depressions; beneath piceous, with a distinct cupreous tinge.

Head bronzy green, with a broad, smooth, longitudinal carina on occiput, and numerous large, irregular, smooth rugae on front; front nearly flat, uneven; surface coarsely, confluently punctate between the rugose elevations, sparsely clothed with long, erect, inconspicuous hairs; clypeus broadly, rather deeply, arcuately emarginate in front, rounded on each side. Antenna bronzy, with a distinct cupreous tinge, slightly narrowed to apex; intermediate segments compact, wider than long, subtruncate at outer margins; third segment nearly as long as following two segments united.

Pronotum twice as wide as long, narrower at apex than at base, widest in front of middle; sides obliquely converging anteriorly, nearly parallel at middle, arcuately converging posteriorly to posterior angles; anterior margin arcuately emarginate, without a median lobe; base broadly, arcuately emarginate on each side, median lobe strongly produced, and broadly rounded; disk moderately convex, uneven, with a broad, deep, median sulcus extending from base to apex, limited on each side by a broad, smooth, elevated space, and on each side midway between this space and the lateral margin a strongly interrupted, irregular, longitudinal, smooth space; surface coarsely, confluently punctate between the smooth elevations, and sparsely clothed with long, recumbent, white hairs.

Elytra distinctly wider than pronotum, one and three-fourths times as long as wide, widest behind middle (slightly sinuate in front of middle), then arcuately converging to tips, which are conjointly broadly rounded; lateral margins coarsely serrate from humeral angles to apices; basal depressions broad and very deep; humeral depressions broad and shallow; disk moderately convex, uneven; surface glabrous, finely, confluently punctate in depressions. Each elytron with four distinctly elevated, smooth costae; first along sutural margin, narrowly elevated posteriorly, and expanded into interrupted, smooth areas on basal half; second and third strongly interrupted, expanded into broad, smooth, sinuate areas; fourth narrow, slightly elevated, and parallel with lateral margin.

Abdomen beneath coarsely, densely fossulate-punctate, sparsely clothed with long, recumbent, white hairs, the intervals obsoletely granulose; sternites with

vague lateral callosities, the first two visible sternites deeply, longitudinally concave at middles; last visible sternite broadly, deeply, arcuately emarginate at apex, without a distinct submarginal ridge, the lateral margins finely serrate; eighth tergite broadly, shallowly emarginate at apex, densely granulose, coarsely, sparsely punctate, but not longitudinally carinate. Prosternum smooth at middle, coarsely, densely punctate, rugose on each side, sparsely clothed with long, recumbent, white hairs; anterior margin without a distinct median lobe. Anterior femur with a short, obtusely rounded tooth, which is dentate on outer margin. Anterior and middle tibiae arcuate, each with a rounded dilation at apical third; posterior tibia straight.

Length 15.75 mm., width 7 mm.

Redescribed from the male type in the collection of J. N. Knull.

Female.—Differing from the male in having the last visible sternite deeply, narrowly, arcuately emarginate at the apex, and the anterior and middle tibiae nearly straight and unarmed near the apices.

Type locality.—Jemez Springs, N. Mex.

DISTRIBUTION

From material examined:

ARIZONA: South Rim Grand Canyon, June 1925 (E. G. Linsley).
COLORADO: Estes Park, Black Canyon, 7,800 feet, July 7, 1937.
NEW MEXICO: Jemez Springs, July 1919, type series (John Woodgate).

Host.—Unknown.

Chamberlin (1926) states that this species is known only from the type, but the species was described from one male and two females collected at the type locality during July by John Woodgate.

No variation worthy of note has been observed in the few specimens examined except in size, the length ranging from 14 to 17.5 mm.

(75) CHRYSOBOTHRIS ORONO Frost

(Fig. 71; fig. 121, *E*)

Chrysobothris orono Frost, 1920, Canad. Ent. 52: 232; Nicolay, 1921, N. Y. Ent. Soc. Jour. 29: 175; Frost, 1923, Canad. Ent. 55: 281; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 165; Knull, 1930, Ent. News 41: 83; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 644; Chamberlin, 1934, Pan-Pacific Ent. 10: 42, fig. 28.

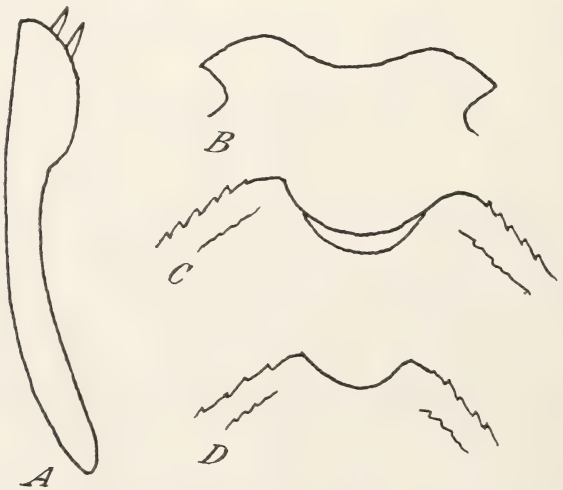

FIGURE 71.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris orono*.

Male.—Broadly elongate, slightly convex above, rather strongly shining, piceous, with a faint purplish reflection on elevated, smooth spaces, bronzy green, vaguely cupreous or greenish in certain lights in the depressed, punctured areas; beneath purplish cupreous, with a vague bronzy reflection in certain lights, more or less greenish on prosternum, legs, and sutural margins of abdominal sternites, and more strongly shining than above.

Head bronzy green, with a narrow, smooth, longitudinal carina on occiput, and two small, inconspicuous, smooth callosities on front; front flat; surface finely, densely punctate, sparsely clothed with moderately long, erect, inconspicuous hairs; clypeus broadly, rather deeply, arcuately emarginate in front, arcuately rounded on each side. Antenna nearly equal in width to apex, bright green, the last segment and apices of intermediate segments piceous; intermediate segments subtriangular, not compact, as long as wide, broadly rounded at outer margins; third segment as long as following two segments united.

Pronotum nearly twice as wide as long, wider at base than at apex, widest near base; sides arcuately converging at apical angles, slightly sinuate and nearly parallel from near apical angles to near posterior angles, which are rectangular; anterior margin arcuately emarginate, without a median lobe; base transversely sinuate on each side, median lobe slightly produced and broadly rounded; disk moderately convex, uneven, with a broad, longitudinal, median depression, limited on each side on apical half by a broad, irregular, smooth callosity, and on each side at apical third midway between this callosity and lateral margin a short, sinuate callosity; surface densely, finely, irregularly punctate, more coarsely punctate and with a few short hairs at sides.

Elytra distinctly wider than pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins strongly serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous. Each elytron with the first costa strongly elevated from apex to basal fourth, the other costae replaced by short, smooth lines, and smooth, irregular, transverse spaces, alternating with finely, densely punctured areas.

Abdomen beneath rather densely, irregularly, shallowly fossulate-punctate, sparsely clothed with short, recumbent, inconspicuous hairs, without distinct lateral callosities, intervals indistinctly granulose; last visible sternite broadly, semicircularly emarginate at apex, with a short, vague, serrate, submarginal ridge, lateral margins coarsely serrate; eighth tergite thickened at apex, densely granulose, coarsely, sparsely punctate, dorsal margin slightly emarginate at apex. Prosternum densely, finely punctate, very densely clothed with long, erect, white hairs at middle, more sparsely, coarsely punctate at sides; anterior margin truncate, without a median lobe. Anterior femur with a large, obtusely angulated tooth, which is strongly dentate on outer margin. Anterior tibia strongly arcuate, with a rather broad dilation at apex; middle tibia strongly arcuate, gradually expanded toward apex; posterior tibia straight.

Length 14.5 mm., width 6 mm.

Redescribed from the male type in the collection of C. A. Frost.

Female.—Differing from the male in having the head purplish brown, with the intervals nearly smooth, the callosities on the front more distinct, the antenna bronzy brown, becoming more cupreous on basal segments, the prosternum more finely punctate and sparsely pubescent, the last visible sternite more shallowly emarginate at apex, the eighth tergite rounded at apex and confluently punctate, and the tibiae unarmed at apices.

Type locality.—Orono, Maine.

DISTRIBUTION

From material examined:

MAINE: Orono, July 4, 1908, male type (C. A. Frost); July 26, 1905, female allotype (J. N. Knull).
MICHIGAN: Marquette, July 1 (Hubbard and Schwarz).
VIRGINIA: Nelson County, June 25, 1928 (W. Robinson).

Recorded by Knull (1930) from North Carolina and Fresno County, Tenn.

Host.—Unknown.

Scarcely any variation was observed in the few specimens examined, but Knull (1930) states that the southern specimens have the chitinized areas of the dorsal surface of the body more pronounced and lack the grayish-green color of the punctured areas, which are distinctly marked in the type and allotype.

(76) CHRYSOBOTHRIS HUBBARDI, new species

(Fig. 72)

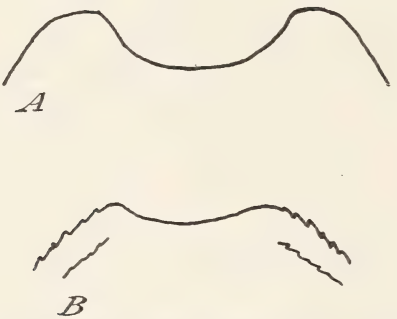

FIGURE 72.—Clypeus (*A*) and last visible abdominal sternite of the female (*B*) of *Chrysobothris hubbardi.*

Female.—Broadly elongate, moderately convex above, rather strongly shining, piceous on elevated, smooth spaces, distinctly cupreous in depressed, punctured areas; beneath cupreous, with a faint greenish tinge, and more strongly shining than above.

Head reddish cupreous, with a broad, elongate, smooth space on occiput, and two small, smooth callosities on front; front slightly convex; surface coarsely, confluently punctate, sparsely clothed with short, inconspicuous, semierect hairs; clypeus deeply, broadly, arcuately emarginate in front, arcuately rounded on each side. Antenna bronzy green, gradually narrowed to apex; intermediate segments subtriangular, not compact, as long as wide, broadly rounded at outer margins; third segment as long as following two segments united.

Pronotum twice as wide as long, wider at base than at apex, widest near base; sides arcuately converging at base, slightly sinuate and converging from near posterior angles to apical angles; anterior margin arcuately emarginate, without a median lobe; base arcuately emarginate on each side, median lobe slightly produced and broadly rounded; disk moderately convex, uneven, with a broad, longitudinal, median depression, and two broad, elongate, elevated, smooth spaces on each side; surface irregularly, confluently punctate between smooth spaces, and with a few short hairs at sides.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions smaller and shallower; surface glabrous. Each elytron with first costa slightly elevated and irregular on apical half, the other costae replaced by broad, irregular, elevated, smooth spaces, alternating with finely, densely punctured areas.

Abdomen beneath rather densely, finely punctate, rather densely clothed with short, erect, white hairs, with slightly elevated, smooth, lateral callosities, intervals indistinctly granulose; last visible sternite broadly, shallowly, arcuately emarginate at apex, with a vague, serrate, submarginal ridge, lateral margins coarsely serrate; eighth tergite very deeply, confluently punctate, with a few inconspicuous, erect hairs, and broadly rounded at apex. Prosternum coarsely, irregularly punctate, sparsely clothed with long, recumbent hairs; anterior margin with median lobe vaguely indicated. Anterior femur with a large, rather acute tooth, which is not distinctly dentate on outer margin. Anterior and middle tibiae slightly arcuate, unarmed; posterior tibia straight.

Length 17 mm., width 7 mm.

Male.—Unknown.

Type locality.—Crescent City, Fla.

Type.—In the United States National Museum, No. 55296.

Described from a single female collected at the type locality, May 21, by Hubbard and Schwarz.

This species resembles *orono* Frost, but it differs from that species in being more robust, and more cupreous above, and in having the first costa on each elytron interrupted posteriorly and not strongly elevated, and the last visible sternite very shallowly emarginate at the apex.

(77) CHRYSOBOTHRIS SCABRIPENNIS Castelnau and Gory

(Fig. 73; fig. 121, *F*)

Chrysobothris scabripennis Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, p. 53, pl. 9, fig. 71; LeConte, 1857, Explorations and Survey Pacific R. R. Rpt. 12 (2): 17; 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 235–236; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1427; Saunders, 1871, Cat. Buprestidarum, p. 98; Austin, 1874, Boston Soc. Nat. Hist. Proc. 16: 269; Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 89–90, pl. 3, figs. 85–89; Evans, 1895, Canad. Ent. 27: 146; Wickham, 1902, Iowa Univ. Lab. Nat. Hist. Bul. 5: 268 (identification?); Felt, 1906, N. Y. State Mus. Mem. 8: 753; Woodworth, 1913, Guide to California Insects, p. 196 (identification?); Chagnon, 1917, Quebec Soc. Protect. Plants Ann. Rpt. 9, sup., pt. 3: 218; Knull, 1920, Ent. News 31: 6; Canad. Ent. 54: 83; 1925, Ohio State Univ. Studies 2 (2): 31; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 196; 1929, Pan-Pacific Ent. 5: 111; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 649; Chamberlin, 1934, Pan-Pacific Ent. 10: 41, fig. 11.

Buprestis (*Odontomus*) *proxima* Kirby, 1837, Fauna Boreali-Amer., v. 4, pp. 157–158; Bethune, 1872, Canad. Ent. 4: 33.

Chrysobothris proxima Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1427.

Chrysobothris consimilis Dejean, 1833, Cat. Coléopt., ed. 2, p. 80; 1836, ed. 3, p. 90 (no description).

(?) *Chrysobothris scabra* Gory, 1840, Monog. Buprestides, sup. 4, p. 182, pl. 31, fig. 178.

The list of citations to the literature is not complete, only the more important ones being listed.

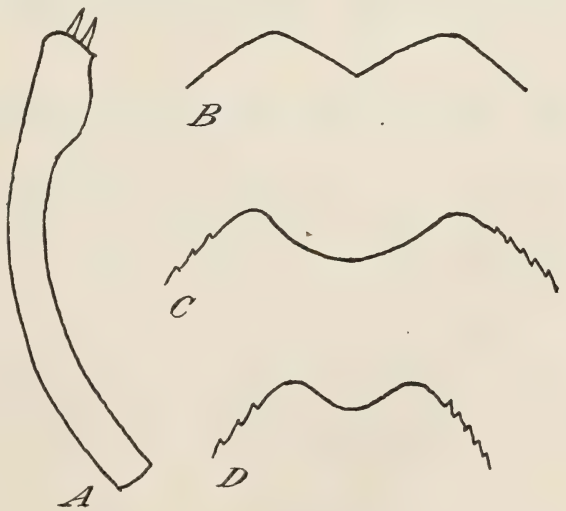

FIGURE 73.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris scabripennis*.

Male.—Rather broadly elongate, slightly convex above, moderately shining, piceous on the elevated spaces, bronzy green, with a slight cupreous tinge in the depressed areas; beneath purplish brown, becoming more or less bronzy green on the legs, and more strongly shining than above.

Head uniformly bright green, with two small, smooth callosities on front, and a rather broad, smooth, longitudinal carina on occiput; front flat; surface finely, confluently punctate, rather densely clothed with long, erect, inconspicuous hairs, clypeus broadly, deeply, angularly emarginate in front, broadly rounded on each side. Antenna green, slightly brownish at outer margins of segments, gradually narrowed to apex; intermediate segments subtriangular, about as long as wide, subtruncate at outer margins; third segment nearly as long as following two segments united.

Pronotum twice as wide as long, wider at base than at apex, widest near apex; sides abruptly converging at apical angles, slightly, arcuately converging from near apical angles to posterior angles; anterior margin broadly, deeply, arcuately emarginate, with an obsolete, rounded, median lobe; base arcuately emarginate on each side, median lobe slightly produced and broadly rounded; disk slightly convex, more or less uneven, with a broad, shallow, longitudinal, median depression, which is wider in front than behind, and limited on each side by a slightly elevated, irregular, smooth space, between which and the lateral margin are a number of transverse, smooth plicae; surface between elevations densely, finely, irregularly punctate, sparsely clothed with short, erect, inconspicuous hairs.

Elytra slightly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately narrowly rounded; lateral margins finely serrate; basal and humeral depressions broad and rather shallow; surface glabrous, uneven, finely, densely, irregularly punctate between the elevated, smooth spaces. Each elytron with four more or less distinct, smooth costae, but these irregular, more or less interrupted, and irregularly connected to one another by transverse, elevated, smooth lines.

Abdomen beneath coarsely, sparsely, irregularly punctate, sparsely clothed with short, recumbent, whitish hairs, without lateral callosities, intervals finely granulose; last visible sternite deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite densely, coarsely punctate, thickened at apex, upper margin broadly, angularly emarginate at apex, and projecting over lower margin, which is broadly rounded at apex, Prosternum coarsely, densely punctate, rather densely clothed with long, erect, white hairs; anterior margin subtruncate, without a distinct median lobe. Anterior femur with a short, obtuse tooth, which is slightly dentate on outer margin. Anterior and middle tibiae strongly arcuate, the former with a rather long, rounded dilation along apical fourth, the latter gradually expanded at apex; posterior tibia slightly arcuate.

Length 10.5 mm., width 4.5 mm.

Redescribed from a male in the United States National Museum from the White Mountains, N. H. (Hubbard and Schwarz collection).

Female.—Differing from the male in having the front of the head uniformly brownish cupreous, more coarsely punctured, and sparsely pubescent, the antenna uniformly bronzy green or brownish cupreous, the last visible sternite more elongate and more shallowly, narrowly emarginate at apex, the eighth tergite deeply, confluently punctured, rounded or slightly emarginate but not thickened at apex, the anterior tibia unarmed at apex, and the posterior tibia straight.

Type locality.—Of *scabripennis*, *proxima*, and *consimilis*, North America; type of *proxima* in British Museum, but present location of the types of *scabripennis* and *consimilis* is unknown to the writer. Of *scabra*, "Amérique du Sud"; type supposed to be in the Natural History Museum, Geneva, Switzerland.

DISTRIBUTION

From material examined:

MAINE: Mount Desert Island, June–July (William Procter), Bar Harbor, June 7, 1921 (C. W. Johnson). Wissataquoik River, June 25, 1901 (H. F. Wickham).
MASSACHUSETTS: Framingham, June 14, 1909 (C. A. Frost). North Saugus, 1906 (F. H. Mosher). Hatfield (H. F. Wickham).
MICHIGAN: Marquette, June; White Fish Point (Hubbard and Schwarz).
MINNESOTA: Lake Itasca, May (H. F. Wickham).
NEW BRUNSWICK: Penobsquis, July 27, 1926 (C. A. Frost). Bathurst, July 10 (J. N. Knull).
NEW HAMPSHIRE: White Mountains (Hubbard and Schwarz). Pike, June 27, 1908 (W. F. Fiske).
NEW YORK: Cranberry Lake; Syracuse.
PENNSYLVANIA: Charter Oak, June 29, 1917 (A. B. Champlain); reared (F. C. Craighead). Hummelstown, June 18, 1918 (J. N. Knull).
WEST VIRGINIA: No definite locality (F. E. Brooks).
WISCONSIN: Cranmoor, May (Hardenberg). Bayfield (H. F. Wickham). Iron River, June 19, 1933.

Also recorded in the literature from the above States and the following localities:

CALIFORNIA: No definite locality (Woodworth 1913) (identification?).
COLORADO: Rico and Leavenworth Valley (Wickham 1902) (identification?).
ONTARIO: Sudbury District (Evans 1895).
QUEBEC: Terrebonne County, St. Johns County, and Montreal Island (Chagnon 1917).

Chamberlin (1929) records this species as extending across Canada into British Columbia, Yukon, and Alaska, and south into Washington and Oregon.

Hosts.—Adults have been reared from pupae collected in dead northern white pine (*Pinus strobus* Linnaeus) in Pennsylvania by F. C. Craighead. Knull (1922) records the species as breeding in eastern hemlock (*Tsuga canadensis* (Linnaeus) Carrière), and Felt (1906) lists it under spruce (*Picea* sp.) borers.

The color in the depressions on the dorsal surface of the body varies from reddish cupreous to bright bronzy green, and on the front of the head in the males from bright green to bronzy green. In some examples the sides of the pronotum are slightly sinuate and nearly parallel at the middle, with two or three depressions on each side between the median sulcus and the lateral margin. The clypeus is more shallowly emarginate in some specimens. In some specimens examined the underside of the body has a rather distinct bronzy-green reflection. The length is from 9 to 13 mm.

LeConte (1857) erroneously records *scabripennis* as a synonym of *trinervia* Kirby, and Gemminger and Harold (1867) place *consimilis* Dejean as a synonym of *scabripennis*. Saunders (1871) places *proxima* Kirby and *scabra* Gory as synonyms of *scabripennis*, but *scabra* was described from a specimen in the Reiche collection from South America, and either this specimen is wrongly labeled as to locality or the synonymy is not correct. Chamberlin (1929) states that *proxima* Kirby (1837) has priority over *scabripennis* Castelnau and Gory, but there is some doubt about this statement. He gives 1838 as the date of publication for *scabripennis*, but plate 9 figuring this species is dated 1837.

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(78) CHRYSOBOTHRIS TRINERVIA (Kirby)

(Fig. 74; fig. 122, *A*)

Buprestis (*Odontomus*) *trinervia* Kirby, 1837, Fauna Boreali-Amer., v. 4, p. 157, pl. 2, fig. 9; Bethune, 1872, Canad. Ent. 4: 32–33.

Chrysobothris trinervia White, 1848, Nomencl. Coleopt. Insects Brit. Mus., pt. 3, p. 34; Mannerheim, 1853, Soc. Imp. Nat. Moscou Bul. 26: 220–221 (separate, pp. 128–129); LeConte, 1857, Explorations and Survey Pacific R. R. Rpt. 12 (2): 6, 17; 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 235; Austin, 1874, Boston Soc. Nat. Hist. Proc. 16: 269; Hubbard and Schwarz, 1878, Amer. Phil. Soc. Proc. 17: 636; LeConte, 1878, U. S. Geol. Geog. Survey Bul. 4 (2): 467; Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 90–91, pt. 4, figs. 90–99; Packard, 1890, U. S. Ent. Comn. Rept. 5: 680, 685, figs. 221–222; Evans, 1895, Canad. Ent. 27: 146; Hamilton, 1895, Amer. Ent. Soc. Trans. 22: 364; Cockerell, 1898, N. Mex. Agr. Expt. Sta. Bul. 28: 151; Wickham, 1899, Ent. News 10: 7, 122; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 118; Blatchley, 1910, Coleoptera of Indiana, pp. 788, 791; Fall, 1910, N. Y. Ent. Soc. Jour. 18: 47, fig. 1d; Burke, 1917, U. S. Dept. Agr. Bul. 437, pl. 2, fig. 4 (larva); 1918, Jour. Econ. Ent. 11: 211; Swaine, 1919, Canada Arctic Exped. 1913–1918 Rpt. 3, pt. E: 13; Mundinger, 1924, N. Y. State Col. Forestry Tech. Pub. 17 (4): 316; Knull, 1925, Ohio State Univ. Studies 2 (2): 31–32; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 174–175; Leonard, 1928, N. Y. (Cornell) Agr. Expt. Sta. Mem. 101: 360; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 655–656; Chamberlin, 1934, Pan-Pacific Ent. 10: 42, fig. 26; Bedard, 1938, Canad. Ent. 70: 191; Procter, 1938, Biol. Survey Mt. Desert Island, pt. 6 (Insect Fauna), p. 123; Brimley, 1938, Insects of North Carolina, p. 172.

Chrysobothris cicatricosa Motschulsky, 1852, Études Ent. 1: 77.

The list of citations to the literature is not complete, only the more important ones being listed.

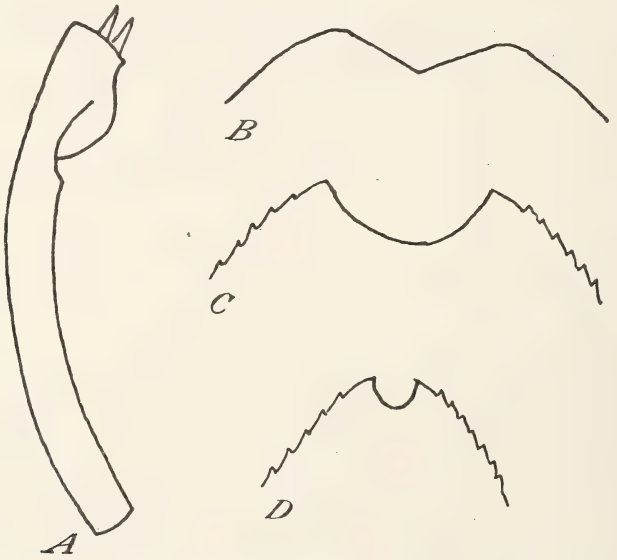

FIGURE 74.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris trinervia*.

Male.—Rather broadly elongate, slightly convex above, rather strongly shining, piceous on elevated spaces, bronzy green, with a slight cupreous tinge in depressed areas; beneath purplish brown with a faint greenish reflection in certain lights, becoming bronzy green on legs, and more strongly shining than above; tarsi greenish blue.

Head bronzy green, more or less cupreous on elevated spaces, with a rather broad, smooth, longitudinal carina on occiput, and two smooth, irregular callosities on front; front nearly flat; surface coarsely, irregularly, confluently punctate, sparsely clothed with long, erect, inconspicuous hairs; clypeus broadly, deeply, angularly emarginate in front, arcuately rounded on each side. Antenna bronzy green, gradually narrowed to apex; intermediate segments subtriangular, about as long as wide, subtruncate at outer margins; third segment nearly as long as following two segments united.

Pronotum nearly twice as wide as long, slightly wider at base than at apex, widest near apex; sides abruptly converging at apex, slightly sinuate and slightly converging from near apical angles to posterior angles; anterior margin deeply, arcuately emarginate, with an obsoletely rounded median lobe; base transversely sinuate on each side, median lobe slightly produced and broadly rounded; disk moderately convex, uneven, with a broad, longitudinal, median depression, limited on each side by a smooth, irregular elevation, a rounded depression on each side at apical fourth, and with numerous irregular callosities or rugae on each side toward lateral margin; surface coarsely, irregularly punctate, with a few short, recumbent, inconspicuous hairs toward lateral margins.

Elytra distinctly wider than pronotum, nearly twice as long as wide, widest behind middle; sides feebly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal and humeral depressions broad and deep; surface glabrous, uneven. Each elytron with four more or less distinct longitudinal costae; first distinct, rather straight posteriorly, sinuate basally; second and third indistinct, interrupted; fourth barely indicated, sinuate, following outline of lateral margin; intervals between costae with alternating densely punctured areas and irregular, smooth, elevated spaces, the smooth spaces connected to the costae.

Abdomen beneath sparsely, finely, irregularly punctate at middle, more densely, coarsely at sides, sparsely clothed with short, semierect, white hairs, with smooth, vague, but not strongly elevated, lateral callosities, intervals indistinctly granulose; last visible sternite broadly, semicircularly emarginate at apex, without a submarginal ridge, lateral margins slightly serrate; eighth tergite thickened at apex, sparsely, finely punctate, dorsal margin deeply, triangularly emarginate at apex, projecting over ventral margin, which is broadly rounded at apex. Prosternum densely, coarsely punctate, somewhat rugose, rather densely clothed with long, semierect, white hairs; anterior margin arcuately rounded, without a median lobe. Anterior femur with an obtusely angulated tooth, which is slightly dentate on outer margin. Anterior tibia strongly arcuate, with a broad, sinuate dilation at apex, slightly constricted behind dilation; middle tibia rather strongly arcuate, gradually dilated toward apex; posterior tibia straight.

Length 12 mm., width 5 mm.

Redescribed from a male in the United States National Museum from Banff, Alberta, Canada, collected August 23, 1927, by Owen Bryant.

Female.—Differing from the male in having the front of the head purplish cupreous, coarsely, sparsely punctate, and more sparsely pubescent, the antenna more cupreous, with a faint bronzy-green tinge, the last visible sternite more elongate, with a small, semicircular emargination at apex, the eighth tergite not thickened, but slightly emarginate at apex, with the surface more coarsely punctured, the prosternum more sparsely, coarsely punctate, and more sparsely pubescent, the anterior tibia unarmed at apex, and the middle tibia not dilated toward apex.

Type locality.—Of *trinervia*, Canada "(latitude 54° and 65°) and the Rocky Mountains"; type in the British Museum. Of *cicatricosa*, Kodiak Island, Alaska; type supposed to be in the Zoological Museum at Moscow.

Distribution.—Material has been examined from various localities in Alberta, British Columbia, Manitoba, New Brunswick, and Nova Scotia, Canada, in Alaska, and in the following States: California, Colorado, Idaho, Maine, Michigan, Minnesota, New Hampshire, New York, Oregon, Utah, Vermont, and Wyoming.

The species is also recorded in the literature from Washington by LeConte (1857), from Utah, New Mexico, and North Carolina by Horn (1886), from Pennsylvania by Hamilton (1895), from South Dakota by Burke (1918), from Kansas by Chamberlin (1926), and from Ontario, Canada, by Evans (1895). Some of these records are probably taken from erroneously identified or mislabeled specimens.

Hosts.—Burke (1918) records this species as breeding in the bark and sapwood of dying and dead limber pine (*Pinus flexilis* James) and western yellow pine (*Pinus ponderosa* Lawson). Mundinger (1924) states that it breeds in spruce (*Picea* sp.) in New York; Bedard (1938) records it breeding in Douglas fir (*Pseudotsuga taxifolia* (LaMarck) Britton) in Idaho, and Chamberlin (1926) gives the hosts as piñon (*Pinus edulis* Engelmann) and northern white pine (*Pinus strobus* Linnaeus).

The color in the depressed punctured areas on the dorsal surface of the body varies from purplish cupreous to bronzy green, and on the front of the head in the males from bright green to bronzy green, with a more or less cupreous reflection. In some examples the sides of the pronotum are parallel and sinuate at the middle, the anterior margin arcuately emarginate without any indications of a median lobe, and the surface with three more or less distinct depressions on each side, two near the median sulcus and one near the lateral margin. The sides of the elytra are nearly parallel or slightly diverging from the humeral angles to behind the middle. The emargination at the apex of the last visible abdominal sternite of the females is variable in size. The length is from 10 to 13 mm.

Mannerheim sent the specimens collected on Kodiak Island, Alaska, to Motschulsky, who described them under the name of *cicatricosa*, which Mannerheim (1853) placed as a synonym of *trinervia* Kirby.

(79) Chrysobothris falli Van Dyke

(Fig. 75; fig. 122, *B*)

Chrysobothris falli Van Dyke, 1918, Ent. News 29: 56–58; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 150; 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 623–624; Chamberlin, 1934, Pan-Pacific Ent. 10: 39, fig. 6.

Male.—Moderately elongate, slightly depressed above, rather strongly shining, piceous with a faint purplish tinge on the smooth, elevated spaces, bronzy cupreous in the punctured areas; beneath brownish cupreous, slightly greenish, more strongly shining than above; legs bronzy green to greenish purple.

Head golden green in front, becoming slightly piceous on occiput, with two small, smooth callosities on front, and a short, broad, smooth carina on occiput; front flat; surface coarsely, deeply, confluently punctate, rather densely clothed with long, erect, inconspicuous hairs; clypeus deeply, angularly emarginate in front, arcuately rounded on each side. Antenna bronzy green, gradually narrowed to apex; intermediate segments compact, distinctly wider than long, broadly rounded at outer margins; third segment nearly as long as following two segments united.

Pronotum nearly twice as wide as long, slightly narrower at apex than at base, widest near apex; sides strongly, arcuately converging at apical angles, sinuate and slightly, obliquely converging from near apical angles to posterior angles; anterior margin arcuately emarginate, with an obsolete, broadly rounded, median lobe; base slightly, arcuately emarginate on each side, median lobe rather strongly produced, and truncate in front of scutellum; disk moderately convex, uneven, with a shallow, broad, median sulcus, limited on each side by

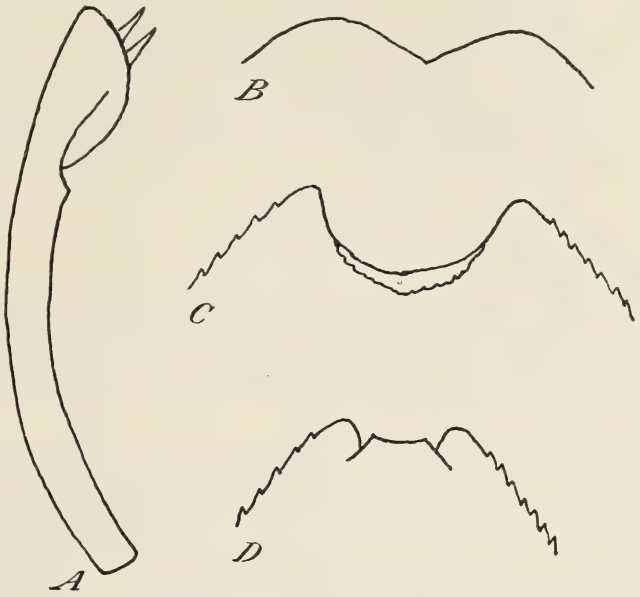

FIGURE 75.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris falli*.

a broad, irregular, smooth callosity, and with two more or less distinct callosities, one anterior and one posterior, on each side toward lateral margin; surface densely, coarsely, deeply punctate, sparsely clothed toward sides with short, white hairs.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions elongate and rather shallow; disk moderately convex, uneven; surface glabrous, finely, densely punctate between the smooth spaces and costae. Each elytron with four more or less distinct costae; first distinct, narrow and strongly elevated posteriorly, broader and flatter anteriorly, straight from apex to middle, parallel with sutural margin; second less elevated and defined, irregular, interrupted at basal third and apical third; third irregular, slightly indicated at middle; fourth irregular, slightly indicated, following outline of lateral margin; all costae joined by irregular, flat, transverse, smooth spaces.

Abdomen beneath sparsely, finely, irregularly punctate, sparsely clothed with short, erect, inconspicuous hairs, without distinct lateral callosities, intervals obsoletely granulose; last visible sternite semicircularly emarginate at apex, without a submarginal ridge, lateral margins slightly serrate; eighth tergite thickened at apex, coarsely, sparsely punctate, densely granulose, dorsal margin rather deeply, angularly emarginate at apex. Prosternum coarsely, densely punctate, more or less transversely rugose, rather densely clothed with long, erect, whitish hairs; anterior margin slightly rounded, without a distinct median lobe. Anterior femur with a broad, obtuse tooth, which is dentate on outer margin. Anterior tibia strongly arcuate, with a broadly rounded dilation at apex, and strongly constricted behind dilation; middle tibia moderately arcuate, gradually expanded toward apex; posterior tibia straight.

Length 11.5 mm., width 4.6 mm.

Redescribed from a male paratype in the United States National Museum from the type locality, kindly donated by Dr. Van Dyke.

Female.—Differing from the male in having the front of the head purplish cupreous, faintly bronzy in the depressions, more coarsely punctate, and more strongly pubescent, the prosternum more sparsely punctured and less densely

pubescent, the last visible abdominal sternite more elongate, arcuately emarginate at apex, with the emargination limited at the bottom by a strongly deflexed plate, which has the anterior margin of the plate arcuately emarginate and entire, the eighth tergite more densely punctured, with a small median notch at apex, and the anterior tibia unarmed at apex.

Type locality.—Donner Lake, Placer County, Calif. Type in the California Academy of Sciences.

DISTRIBUTION

From material examined:

CALIFORNIA: Donner Lake, Placer County, July 3–7, 1916, type series (R. T. Garnett). Meyers, August 8, 1915; Fallen Leaf, August 1, 1915 (F. B. Herbert). Yosemite, July 20, 1918; Crater Lake Park, August 1927 (J. E. Patterson). Truckee, August, 5,800 feet (H. F. Wickham).
OREGON: Albee, August 2, 1913 (W. D. Edmonston). Klamath County, August (Brooklyn Museum coll.).

Also recorded in the literature from the following localities in California: Independence Lake, Nevada County, July 12; Tahoe Tavern, Lake Tahoe, July 12; Tuolumne Meadows, Yosemite National Park, July 18–19, 1916, and Forest Hill, Placer County, April (Van Dyke, 1918).

Hosts.—Adults were reared from lodgepole pine (*Pinus contorta* Loudon) collected at Crater Lake Park, Calif., by J. E. Patterson. Adults were collected on western yellow pine (*Pinus ponderosa* Lawson) and Jeffrey pine (*Pinus jeffreyi* "Oreg. Com.").

Very little variation was observed in the few specimens examined, except in the color in the depressed areas on the dorsal surface of the body, which varies from bronzy green to reddish cupreous. The sides of the pronotum are more strongly sinuate in some specimens than in others. The length is from 11 to 13 mm.

There will be some difficulty in separating the females of *caurina* which do not have the prosternal lobe developed and the females of *falli*. The females of both species have the emargination at the apex of the last visible abdominal sternite limited at the bottom by a deflexed plate, but in *falli* this plate is usually strongly deflexed, with the anterior margin of the plate arcuately emarginate and entire, whereas in *caurina* the plate is usually only slightly deflexed, with the anterior margin of the plate transverse and more or less dentate. Van Dyke (1918) states that *falli* and *caurina* were collected in large numbers at Donner Lake, and that *falli* somewhat replaces *caurina* in the Middle and Southern Sierras and is there generally found in company with *monticola* Fall.

(80) CHRYSOBOTHRIS BREVILOBA Fall

(Fig. 76; fig. 122, *C*)

Chrysobothris breviloba Fall, 1910, N. Y. Ent. Soc. Jour. 18: 51, fig. 1f; Gibson, 1917, Ent. Soc. Ontario Ann. Rpt. (1916) 47: 149; Burke, 1918, Jour. Econ. Ent. 11: 211; Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 193 (separate, p. 192); 1926, Cat. Buprestidae North Amer., p. 140; 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 613; Chamberlin, 1934, Pan-Pacific Ent. 10: 41, fig. 14.

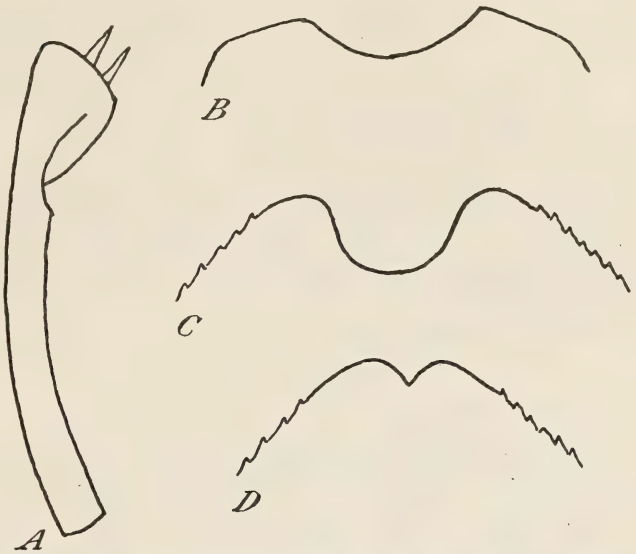

FIGURE 76.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris breviloba*.

Male.—Moderately elongate, rather strongly depressed above, slightly shining, piceous on elevated spaces, cupreous in the depressed, densely punctured areas; beneath piceous, with purplish and greenish reflections, and more strongly shining than above.

Head yellowish green in front, becoming piceous on the occiput, with a distinct, smooth, longitudinal carina on occiput; front nearly flat; surface coarsely, deeply foveolate-punctate, rather densely clothed with long, erect, inconspicuous hairs; clypeus broadly, deeply, arcuately emarginate in front, obliquely subtruncate on each side. Antenna cupreous, greenish on basal segments, gradually narrowed to apex; intermediate segments about as wide as long, broadly subtruncate at outer margins; third segment one-third longer than fourth.

Pronotum three-fourths wider than long, slightly wider at base than at apex, widest near apex; sides strongly converging at apex, obliquely converging from near apical angles to posterior angles; anterior margin deeply, arcuately emarginate, without a median lobe; base slightly, broadly, arcuately emarginate on each side, median lobe slightly produced and broadly rounded; disk slightly convex, very uneven, with numerous well defined, smooth callosities, and a vague, longitudinal, median depression; surface densely, coarsely, irregularly punctate between smooth callosities.

Elytra at base slightly wider than pronotum near apex, twice as long as wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins strongly serrate; basal depressions broad, deep; humeral depressions broad, shallow; surface glabrous, uneven, with numerous small, irregular, smooth spaces, between which the surface is densely, rather finely punctate. Each elytron with four more or less distinct longitudinal costae; first distinct, parallel with sutural margin, narrow and strongly elevated apically, broader and more flattened basally; the other three costae more or less distinct, sinuate, and interrupted by the numerous depressed, punctured areas and smooth, elevated spaces.

Abdomen beneath sparsely, coarsely punctate, sparsely clothed with short, recumbent, white hairs, with slightly indicated, smooth, not elevated spaces, intervals vaguely granulose; last visible sternite deeply, arcuately emarginate at apex, without a submarginal ridge, lateral margins strongly serrate; eighth tergite thickened at apex, sparsely, coarsely punctate, densely granulose, dorsal margin deeply, angularly emarginate at apex. Prosternum coarsely, densely punctate, sparsely clothed with long, semierect, white hairs; anterior margin slightly rounded, without a distinct median lobe. Anterior femur with a broad, obtuse tooth, which is slightly crenulate on outer margin. Anterior

and middle tibiae strongly arcuate, the former with a short dilation at apex, deeply constricted behind the dilation, the latter expanded at apex; posterior tibia straight.

Length 10 mm., width 4 mm.

Redescribed from the male type in the collection of H. C. Fall (Museum of Comparative Zoology).

Female.—Differing from the male in having the front of the head uniformly brownish cupreous, slightly more complex, and more sparsely pubescent, the prosternum more sparsely punctured and pubescent, the last visible sternite more elongate, with a small, narrow, angular notch at apex, and a more or less distinct, dentate, subapical ridge, the eighth tergite more coarsely punctate, and slightly emarginate at apex, the anterior tibia unarmed at apex, and the middle tibia straight.

Type locality.—Boulder, Colo.

DISTRIBUTION

From material examined:

ARIZONA: Prescott, June 1917 (Barber and Schwarz).
COLORADO: Leadville, Boulder, type, Silver Plume, Buena Vista, Colorado Springs, Salida, Florissant, Waldo Canyon, Mt. Manitou, and Larkspur, June to August (numerous collectors).
MONTANA: Chico, August 9, 1907 (W. Robinson).
NEW MEXICO: Capitan, April 28, 1907, reared; Meek, April 24, 1907, reared (W. F. Fiske). Vermego, May 8, 1903 (A. D. Hopkins). Roswell, April 14; Santa Fe, June (T. D. A. Cockerell).
SOUTH DAKOTA: Elmore, July 23, 1902 (J. L. Webb). Hot Springs (H. F. Wickham).
TEXAS: Davis Mountains, April 10, 1907.
UTAH: Eureka, June 27 (Tom Spalding).
WYOMING: Yellowstone National Park (H. F. Wickham).

Also recorded in the literature from:

ALBERTA: Banff, July 2, 1915 (Gibson 1917).
BRITISH COLUMBIA: Peachland, July 22, 1915 (Gibson 1917).
IDAHO: Cascade, June 20 (Chamberlin 1926).
OREGON: Eastern part (Chamberlin 1925).

Some of these records may be from wrongly identified specimens.

Hosts.—Specimens have been examined that were reared from western yellow pine (*Pinus ponderosa* Lawson), limber pine (*Pinus flexilis* James), piñon (*Pinus edulis* Engelmann), and Douglas fir (*Pseudotsugae taxifolia* (LaMarck) Britton). Burke (1918) records this species as mining the bark and sapwood of dying and dead trees. Chamberlin (1926) records it from lodgepole pine (*Pinus contorta* Loudon).

The sculpture on the dorsal surface of the body is rather constant, but the color in the depressed areas varies from bronzy green to purplish cupreous. Sometimes the anterior margin of the pronotum is slightly lobed, and the sides are sinuate and parallel at the middle. Frequently there are two small, smooth callosities on the front of the head, and the clypeus is sometimes triangularly emarginate in front. The length is from 8.5 to 12 mm.

(81) CHRYSOBOTHRIS LARICIS Van Dyke

(Fig. 77; fig. 122, *D*)

Chrysobothris laricis Van Dyke, 1916, Ent. News 27: 409–411, fig. 3; Chamberlin, 1917, Ent. News 28: 138; Van Dyke, 1918, Ent. News 29: 58; Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 192 (separate, p. 191); 1926, Cat. Buprestidae North Amer., p. 159; 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 638; Chamberlin, 1934, Pan-Pacific Ent. 10: 42, fig. 16.

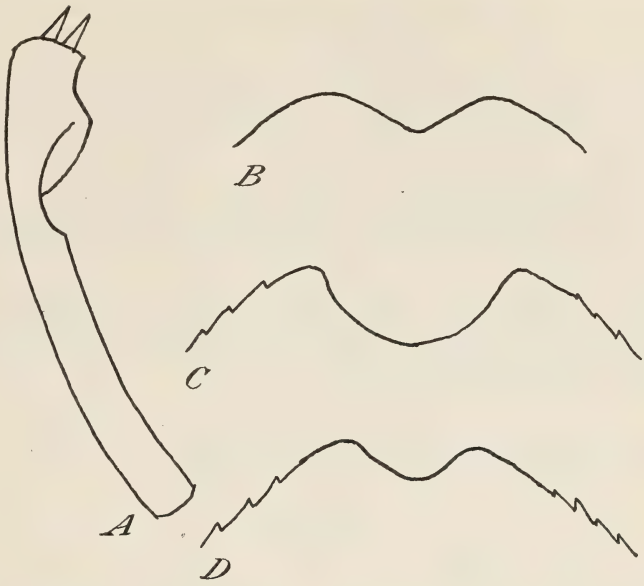

FIGURE 77.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris laricis*.

Male.—Moderately elongate, moderately convex above, rather strongly shining, piceous with a distinct purplish tinge on the smooth, elevated spaces, bronzy green in the punctured areas; beneath bronzy green, faintly purplish along sides, and more strongly shining than above.

Head bronzy green, with two small callosities on front, and a distinct, smooth, longitudinal carina on occiput; front flat; surface coarsely, densely punctate, rather densely clothed with moderately long, erect, inconspicuous hairs; clypeus broadly, deeply, angularly emarginate in front, arcuately rounded on each side. Antenna bronzy green, gradually narrowed to apex; intermediate segments subtriangular, slightly wider than long, broadly rounded at outer margins; third segment nearly as long as following two segments united.

Pronotum twice as wide as long, slightly wider at base than at apex, widest along middle; sides parallel and slightly sinuate at middle, arcuately converging anteriorly and posteriorly; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base arcuately emarginate on each side, median lobe rather strongly produced, narrowly truncate in front of scutellum; disk moderately convex, uneven, with a shallow, poorly defined, median sulcus, limited on each side anteriorly by an obscure, irregular callosity; surface coarsely, densely punctate, more or less transversely rugose toward sides.

Elytra distinctly wider than pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins slightly serrate; basal and humeral depressions broad and deep; surface glabrous, uneven, coarsely, densely punctate between costae and elevated smooth spaces. Each elytron with four more or less distinct longitudinal costae; first poorly defined anteriorly, distinct and strongly elevated posteriorly, gradually diverging from sutural margin from middle to near apex, where it is arcuate; second and third irregular, somewhat flattened, more or less interrupted; fourth sinuate, following outline of lateral margin; all costae joined to one another by irregular, transverse, smooth spaces.

Abdomen beneath densely, coarsely, irregularly punctate, sparsely clothed at sides with short, recumbent, white hairs, without distinct lateral callosities, intervals densely granulose; last visible sternite deeply, semicircularly emarginate at apex, without a submarginal ridge, lateral margins slightly serrate; eighth tergite rather densely, coarsely punctate, densely granulose, dorsal

margin deeply, triangularly emarginate at apex. Prosternum coarsely, confluently punctate, more or less rugose, densely clothed with long, erect, whitish hairs; anterior margin truncate, without a distinct median lobe. Anterior femur with a broad, obtusely rounded tooth, which is slightly dentate on outer margin. Anterior tibiae strongly arcuate, with an elongate, arcuate dilation, which is distinctly narrowed at apex, strongly constricted behind the dilation; middle tibia moderately arcuate, gradually dilated toward apex; posterior tibia straight.

Length 11 mm., width 4.5 mm.

Redescribed from a male paratype from the type locality in the United States National Museum, kindly donated by Dr. Van Dyke.

Female.—Differing from the male in having the front of the head purplish brown, the underside of the body purplish cupreous, with a distinct bronzy-green tinge, the prosternum more coarsely, sparsely punctured, and more sparsely pubescent, the eighth abdominal tergite more densely punctured, the last visible abdominal sternite narrowly, arcuately emarginate at apex, and the anterior tibia unarmed near apex.

Type locality.—Grant County, Oreg.; type in collection of E. C. Van Dyke (California Academy of Sciences).

DISTRIBUTION

From material examined:

OREGON: Grant County, July 22, 1914, one female and one male paratype (W. J. Chamberlin). Baker, July 30, 1938 (J. H. Baker).

Also recorded in the literature as follows:

CALIFORNIA: Angora Lake, July 7 (Van Dyke 1916). Lake Tahoe and Tuolumne Meadows, Yosemite National Park, July 11, 1916 (Chamberlin 1917).
IDAHO: Cascade, June 26 (Chamberlin 1926).
UTAH: Parawan Mountains (Chamberlin 1926).

Hosts.—The larval habits are unknown, but Van Dyke (1916) records collecting the adults on western larch (*Larix occidentalis* Nuttall) and lodgepole pine (*Pinus contorta* var. *murrayana* Engelmann).

Van Dyke had a fairly good series of specimens when he described the species and stated that—

> The specimens examined from the type locality were quite constant as to size and characters, but a small series collected in the Tuolumne Meadows differed slightly from the typical form found in eastern Oregon in being more cupreous and brilliantly metallic, by having the transverse punctate areas on the elytra more definitely defined, the sutural elevations more widely explanate near the apex, and the dilated portion of the anterior tibia of the male less broad, though of the same type.

He stated further that this species seems to belong in the northern part of the Great Basin, to be found normally on larch and lodgepole pine, and to have followed the latter in its distribution through the high altitudes of the Cascades and Sierras; and he gives the type locality as Grant County, Oreg., but Chamberlin (1926) records the type locality as Sumpter, Oreg.

(82) Chrysobothris sylvania Fall

(Fig. 78; fig. 122, *E*)

Chrysobothris sylvania Fall, 1910, N. Y. Ent. Soc. Jour. 18:50, fig. 1d; Woodworth, 1913, Guide to California Insects, p. 196; Van Dyke, 1916, Ent. News 27: 412; Chamberlin, 1917, Ent. News 28: 139; 1920, N. Y. Ent. Soc. Jour. 28:151–154, pl. 7; 1925, N. Y. Ent. Soc. Jour. (1924) 32: 192 (separate, p. 191); Van Dyke, 1926, Pacific Coast Ent. Soc. Proc. 2 (5):72; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 173; 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 653; Chamberlin, 1934, Pan-Pacific Ent. 10:42, fig. 27.

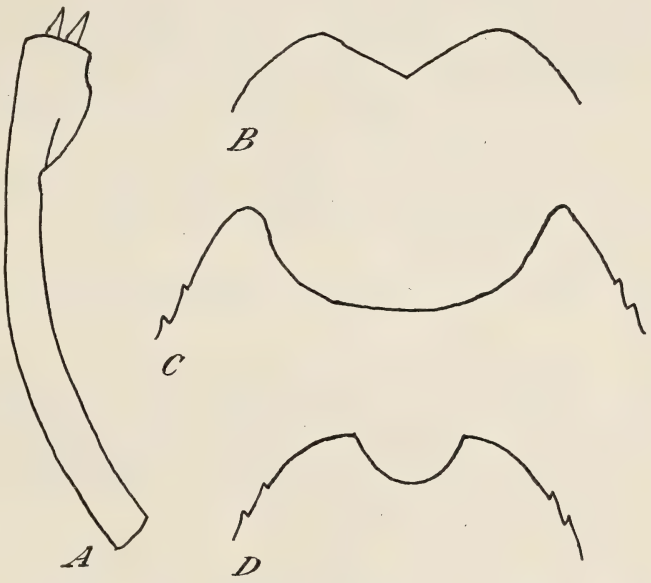

Figure 78.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris sylvania*.

Male.—Moderately elongate, moderately convex above, rather strongly shining, piceous on the elevated, smooth spaces, bronzy green in the densely punctured areas; beneath bright green, more strongly shining than above, with the smooth callosites at sides of abdominal sternites violaceous.

Head yellowish cupreous in front, becoming darker on occiput, with two small, smooth callosities on front, and a distinct, smooth, longitudinal carina on occiput; front nearly flat; surface coarsely, deeply, confluently punctate, rather densely clothed with long, erect, fine, brownish hairs; clypeus broadly, deeply, angularly emarginate in front, arcuately rounded on each side. Antenna uniformly bright green, slightly narrowed to apex; intermediate segments subtriangular, slightly wider than long, broadly rounded at outer margins; third segment about one-fourth longer than fourth.

Pronotum twice as wide as long, slightly wider at base than at apex, widest along middle; sides parallel and sinuate at middle, arcuately converging to apex and base, more strongly posteriorly; anterior margin broadly, arcuately emarginate, without a distinct median lobe; base subtruncate on each side, median lobe slightly produced, broadly rounded in front of scutellum; disk slightly convex, very uneven, with a broad, longitudinal, median sulcus, limited at each side on apical half by a broad, elevated, smooth space, a small, smooth callosity on each side at elytral lobe, and a broad median depression on each side near lateral margin; surface coarsely, deeply, confluently punctate between the smooth callosities.

Elytra at base slightly wider than pronotum at middle, twice as long as wide; sides nearly parallel from humeral angles to apical third (slightly expanded behind middle), then arcuately converging to tips, which are separately broadly rounded; lateral margins rather obscurely serrate; basal depressions broad, irregular, very deep; humeral depressions broad, shallow; surface glabrous, uneven, with numerous small, irregular, smooth spaces connected laterally to the costae, densely, finely punctate between the smooth spaces. Each elytron with four more or less distinct longitudinal costae; first distinct, parallel with sutural margin, slightly sinuate, narrow and strongly elevated, extending from base to apex; the other three costae moderately distinct, narrow, smooth, strongly sinuate, broadly interrupted by the numerous densely punctured areas.

Abdomen beneath rather densely, coarsely fossulate-punctate, except anterior margins of sternites, which are smooth, clothed with a few short, recumbent hairs at sides, intervals obsoletely granulose; each sternite with a small, slightly elevated, smooth callosity on each side near lateral margin; last visible sternite deeply, semicircularly emarginate at apex, without a distinct submarginal ridge, lateral margins serrate; eighth tergite deeply, angularly emarginate at apex, sparsely, coarsely punctate, without a longitudinal carina. Prosternum transversely depressed along anterior margin, coarsely, confluently punctate, densely clothed with long, erect, fine, whitish hairs; anterior margin truncate, without a median lobe. Anterior femur with a broad, obtusely rounded tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae strongly arcuate, the former with a rather long, rounded dilation, which is slightly narrowed near apex, slightly sinuate behind dilation; posterior tibia straight.

Length 11.5 mm., width 5 mm.

Redescribed (except antenna, which is missing from type) from the male type in the collection of H. C. Fall (Museum of Comparative Zoology).

Female.—Differing from the male in having the front of the head cupreous, with a faint violaceous tinge, and more coarsely punctured, the antenna piceous with a bronzy tinge, the underside of the body purplish cupreous, with a bronzy-green reflection, the prosternum coarsely, sparsely punctured, and more sparsely pubescent, the last visible abdominal sternite more elongate, and more narrowly emarginate at apex, the eighth abdominal tergite slightly emarginate at apex, and the anterior tibia unarmed at apex.

Type locality.—Sylvania, Calif.

DISTRIBUTION

From material examined:

BRITISH COLUMBIA: Victoria, July 1, 1904 (Wickham coll.).
CALIFORNIA: Sylvania, type (L. E. Ricksecker).
OREGON: Amity, April 16, 1930 (W. J. Buckhorn).

It is recorded by Van Dyke (1916) from Sonoma and Del Norte Counties, Calif., and Mount Jefferson, Oreg., and by Chamberlin (1926) from Corvallis, Douglas County, and Forest Grove, Oreg.

Hosts.—Chamberlin (1920) records this species as breeding in Douglas fir (*Pseudotsuga taxifolia* (LaMarck) Britton) in Oregon, and gives a rather extensive account of its life history, including descriptions of the egg, larva, and pupa. The same writer (1917) mentioned it as having been collected from apple (*Malus* sp.), but this is probably an error, either in the identification of the specimens or the host plant.

The color in the punctured areas on the dorsal surface of the body varies from brownish cupreous to bronzy green. Frequently the lateral depressions on the pronotum are indistinct, and the surface is ornamented with four small, irregular, smooth callosities arranged transversely in front of the middle. The length is from 11.3 to 12 mm.

(83) Chrysobothris carinipennis LeConte

(Fig. 79; fig. 122, *F*)

Chrysobothris carinipennis LeConte, 1878, U. S. Geol. and Geog. Survey of Terr. 4 (2): 459–460; Kerremans, 1884, Soc. Ent. de Belg. Ann. 28: 149 (separate, p. 35); Horn, 1886, Amer. Ent. Soc. Trans. 13: 85, 91–92, pl. 4, figs. 100–104; Townsend, 1895, Canad. Ent. 27: 43; Wickham, 1902, Iowa Univ. Lab. Nat. Hist. Bul. 5: 268; Cockerell, 1902, Psyche 9: 378; Evans, 1906, Canad. Ent. 38: 98; Fall and Cockerell, 1907, Amer. Ent. Soc. Trans. 33: 180; Fall, 1910, N. Y. Ent. Soc. Jour. 18: 49–50, fig. 1c; Woodworth, 1913, Guide to California Insects, p. 196; Gibson, 1913, Ent. Soc. Ontario Ann. Rpt. (1912) 43: 126; Van Dyke, 1916, Ent. News 27: 406, 408, 410, fig. 2; 1924, Pacific Coast Ent. Soc. Proc. 2 (2): 18; Chamberlin, 1925, N. Y. Ent. Soc. Jour. (1924) 32: 191 (separate, p. 190); 1926, Cat. Buprestidae North Amer., p. 141; Van Dyke, 1926, Pacific Coast Ent. Soc. Proc. 2 (5): 72; Chamberlin, 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 614; Chamberlin, 1934, Pan-Pacific Ent. 10: 42, fig. 25; Bedard, 1938, Canad. Ent. 70: 191.

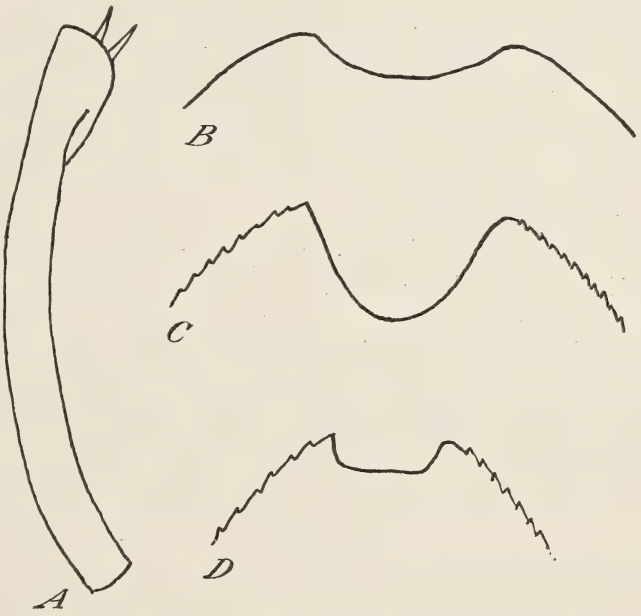

Figure 79.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris carinipennis*.

Male.—Moderately elongate, rather strongly depressed above, strongly shining, piceous with a faint violaceous-black reflection on the smooth spaces, faintly bronzy green in the depressed punctured areas; beneath dark green, with a faint bronzy tinge, and slightly purplish at sides.

Head green, with a faint yellowish-cupreous tinge, with two small, obscure callosities on front, and a distinct, smooth, longitudinal carina on occiput; front nearly flat; surface coarsely, deeply, irregularly, confluently punctate, rather densely clothed with moderately long, erect, inconspicuous hairs; clypeus broadly, rather deeply, arcuately emarginate in front, arcuately rounded on each side. Antenna uniformly bronzy green, slightly narrowed to apex; intermediate segments not very compact, subtriangular, as long as wide, broadly subtruncate at outer margins; third segment slightly shorter than following two segments united.

Pronotum twice as wide as long, slightly narrower at apex than at base, widest along middle; sides parallel at middle, arcuately converging at apex and base; anterior margin rather strongly sinuate, with an obsolete, broadly rounded, median lobe; base slightly, arcuately emarginate on each side, median lobe slightly produced and broadly rounded; disk slightly convex, uneven, with an obscure, broad, longitudinal, densely punctured, median sulcus, limited at each side on apical half by a broad, elevated, smooth callosity, and on each side with numerous small, irregular, smooth callosities; surface coarsely, deeply, irregularly, confluently punctate between the smooth callosities.

Elytra distinctly wider than pronotum, twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad, very deep; humeral depressions broad, moderately deep; surface glabrous, uneven, intervals between costae consisting of finely, densely punctured areas and smooth spaces, the smooth spaces joined to the costae. Each elytron with four more or less distinct longitudinal costae; first distinct, straight, extending along sutural margin from apex to basal depression; second and third irregular, moderately distinct, but interrupted by the punctured spaces; fourth sinuate, indistinct, extending along lateral margin from behind humerus to near apex, where it is united to the second costa.

Abdomen beneath finely, sparsely, irregularly punctate, sparsely clothed at sides with short, recumbent, white hairs, without distinct lateral callosities, intervals indistinctly granulose; last visible sternite deeply, semicircularly emarginate at apex, without a submarginal ridge, lateral margins serrate; eighth tergite thickened at apex, sparsely, finely punctate, dorsal margin deeply, triangularly emarginate at apex. Prosternum coarsely, sparsely, irregularly punctate, sparsely clothed with long, erect, white hairs; anterior margin truncate, without a median lobe. Anterior femur with a broadly rounded tooth, which is slightly dentate on outer margin. Anterior and middle tibiae arcuate, the former with a rather long, feeble dilation at apex, slightly sinuate behind dilation; posterior tibia straight.

Length 13 mm., width 5 mm.

Redescribed from the male type, No. 2697, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—Differing from the male in having the front of the head slightly more convex, purplish cupreous, with a slight greenish tinge, the antenna piceous, with a faint greenish reflection, the last visible abdominal sternite more elongate, broadly, shallowly emarginate at apex, sometimes transversely truncate at middle of emargination, with the external angles strongly produced and rounded, the eighth abdominal tergite coarsely, densely punctate, with a small, triangular notch at apex, and the anterior tibia unarmed at apex.

Type locality.—American Fork Canyon (9,500 feet), Utah.

DISTRIBUTION

From material examined:

ARIZONA: Bright Angel Ranger Station, north rim Grand Canyon, June 26, 1924 (G. Hofer).

BRITISH COLUMBIA: Frye Creek, July 23, 1903 (R. P. Currie and A. N. Caudell). Merritt, Midway Valley, June 28, 1924 (K. F. Auden).

COLORADO: Colorado Springs, June 15–30, 1896, 6,000 to 7,000 feet (H. F. Wickham). Waldo Canyon, July 12, 1916 (W. D. Edmonston).

MONTANA: Chico, August 9, 1907 (W. Robinson). Bozeman, 4,800 feet ("Cooley").

NEVADA: No definite locality.

UTAH: American Fork Canyon, 9,500 feet, August 2–3, 1877, type (F. C. Bowditch). Kamas, July 30, 1907 (H. E. Burke).

WYOMING: Yellowstone National Park, August 12, 1907 (W. Robinson); July 31 (Hubbard and Schwarz).

This species has been recorded in the literature from various localities in Arizona, California, Colorado, Idaho, Michigan, Montana, Nevada, New Mexico, Oregon, Utah, and Washington, but many of

these records refer to some of the closely allied species which are confused under *carinipennis* in most collections.

Hosts.—Bedard (1938) reports that Burke identified the larvae collected beneath the bark of Douglas fir (*Pseudotsuga taxifolia* (LaMarck) Britton) during October in Idaho as this species, and the adults have been collected by Hofer in Arizona and by Burke in Utah on this host plant. The species has been recorded in the literature from western yellow pine (*Pinus ponderosa* Lawson), sugar pine (*Pinus lambertiana* Douglas), lodgepole pine (*Pinus contorta* Loudon), piñon (*Pinus edulis* Engelmann), and western larch (*Larix occidentalis* Nuttall), but on account of the number of other species confused under *carinipennis* these host records should be verified before being accepted.

The color in the punctured areas on the dorsal surface of the body varies from reddish cupreous to bronzy green, and on the front of the head in the males from green, through yellowish green, to reddish cupreous. The clypeus is usually arcuately, rarely angularly, emarginate in front. The sculpture on the pronotum is more or less variable, and the sides are usually parallel and more or less sinuate at the middle, but occasionally specimens are found with the pronotum widest near the apical angles, and the sides strongly, obliquely converging posteriorly. The prosternum is sometimes smooth at the middle and more or less rugose toward the sides. The length is from 10.5 to 13 mm.

This species was described by LeConte from a single male. Horn (1886) records it from Colorado and Nevada, but does not mention the type locality Utah; in fact, the specimens mentioned by him from Colorado are not this species.

(84) Chrysobothris pseudotsugae Van Dyke

(Fig. 80; fig. 123, *A*)

Chrysobothris pseudotsugae Van Dyke, 1916, Ent. News 27: 407–409, fig. 1; Chamberlin, 1917, Ent. News 28: 138; 1925, N. Y. Ent. Soc. Jour. (1924) 32: 192 (separate, p. 191); 1926, Cat. Buprestidae North Amer., p. 166; Van Dyke, 1926, Pacific Coast Ent. Soc. Proc. 2 (5): 72; Chamberlin, 1929, Pan-Pacific Ent. 5: 115; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 645–646; Chamberlin, 1934, Pan-Pacific Ent. 10: 42, fig. 15; Bedard, 1938, Canad. Ent. 70: 191.

Male.—Moderately elongate, rather strongly depressed above, strongly shining, piceous on the smooth elevated spaces, bronzy green in the punctured areas; beneath dark green, slightly purplish at sides.

Head uniformly bronzy green, with two small callosities on front, and a distinct, smooth, longitudinal carina on occiput; front flat; surface coarsely, deeply, confluently punctate, rather densely clothed with long, erect, inconspicuous hairs; clypeus broadly, deeply, subangularly emarginate in front, arcuately rounded on each side. Antenna bronzy green, slightly piceous at outer margins of segments, gradually narrowed to apex; intermediate segments not compact, subtriangular, as long as wide, broadly subtruncate at outer margins; third segment one-third longer than fourth.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest along middle; sides parallel and slightly sinuate at middle, slightly converging at base and apex; anterior margin rather strongly sinuate, with a small, broadly rounded, median lobe; base broadly, arcuately emarginate on each side, the median lobe slightly produced, and narrowly truncate in front of scutellum; disk moderately convex, with a broad, longitudinal, densely punctured, median sulcus, limited at each side on apical half by a broad, elevated, smooth callosity, and on each side midway between this callosity and lateral margin an irregular, smooth, longitudinal callosity, which is broadly interrupted

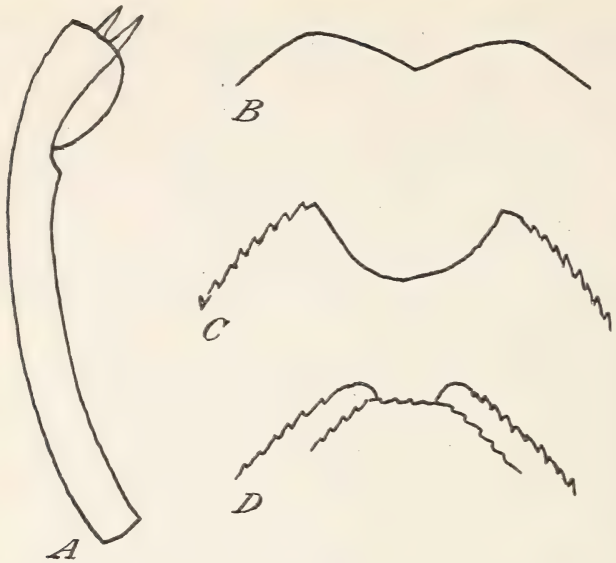

FIGURE 80.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris pseudotsugae*.

at middle; surface coarsely, densely, irregularly punctate between the smooth callosities.

Elytra distinctly wider than pronotum, nearly twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins slightly serrate; basal depressions broad, very deep; humeral depressions broad, shallow; surface glabrous, uneven, densely, finely punctate between the elevated, smooth spaces. Each elytron with four more or less distinct costae; first distinct, narrow and strongly elevated posteriorly, broader and flatter anteriorly, slightly diverging from sutural margin from middle to apex; second and third rather distinct, irregular, strongly interrupted; fourth indistinct, irregular, following outline of lateral margin; all costae joined to one another by irregular, smooth, transverse spaces.

Abdomen beneath rather sparsely, coarsely punctate, sparsely clothed at sides with short, recumbent, white hairs, without distinct lateral callosities, the intervals obsoletely granulose; last visible sternite deeply, semicircularly emarginate at apex, without a submarginal ridge, the lateral margins slightly serrate; eighth tergite thickened at apex, densely granulose, rather densely, coarsely punctate, the dorsal margin deeply, triangularly emarginate at apex. Prosternum coarsely, sparsely punctate, nearly smooth at middle, sparsely clothed with moderately long, erect, white hairs; anterior margin truncate, without a median lobe. Anterior femur with a small, broadly obtuse tooth, which is finely dentate on outer margin. Anterior and middle tibiae arcuate, the former with a short, elongate dilation at apex, slightly constricted behind dilation; posterior tibia straight.

Length 10.5 mm., width 4.25 mm.

Redescribed from a male paratype from the type locality in the United States National Museum, kindly donated by Dr. Van Dyke.

Female.—Differing from the male in having the front of the head purplish cupreous, sometimes with a faint bronzy-green tinge, the last visible sternite more elongate, broadly, shallowly, arcuately emarginate at apex, sometimes truncate in middle of emargination, the eighth tergite more densely punctured, with a small, triangular notch at apex, and the anterior tibia unarmed at apex.

Type locality.—Carrville, Trinity County, Calif.; type in collection of E. C. Van Dyke (California Academy of Sciences).

DISTRIBUTION

From material examined:

CALIFORNIA: Carrville, Trinity County, June 30, 1913, paratype (E. C. Van Dyke). Onion Valley, July 29, 1913 (H. E. Burke). Yosemite, May 19, 1931, 3,880 to 4,000 feet altitude (E. G. Linsley). Fallen Leaf, July 28, 1915 (F. B. Herbert). Dos Rios, Mendocino County, May 28, 1939 (W. F. Barr).
IDAHO: No definite locality.
NEVADA: No definite locality (Riley Collection).
OREGON: Crater Lake, December 14, 1933 (W. J. Buckhorn). Ashland, July 3, 1917 (T. E. Snyder).

Also recorded in the literature as follows:

CALIFORNIA: Fallen Leaf Lake; Lake Tahoe, June (Van Dyke 1916). Weed, August 11, 1915 (Chamberlin 1917).
IDAHO: Coeur d'Alene, July (Bedard 1938).
OREGON: Mount Hood (Van Dyke 1926).

Van Dyke (1916) states that the species is apparently moderately abundant in northern California and the northern Sierras, and no doubt extends farther north. It apparently is one of the species which replace *carinipennis* LeConte west of the Cascades and Sierras, *carinipennis* seeming to be restricted to the Rockies and the northern portion of the Great Basin.

Hosts.—Bedard (1938) records the females as ovipositing in Douglas fir (*Pseudotsuga taxifolia* (LaMarck) Britton). The adults have been collected on white fir (*Abies concolor* Lindley and Gordon), lowland white fir (*Abies grandis* Lindley), western yellow pine (*Pinus ponderosa* Lawson), Jeffrey pine (*Pinus jeffreyi* "Oreg. Com."), and mountain hemlock (*Tsuga mertensiana* (Bongard) Sargent).

The color in the punctured areas on the dorsal surface of the body varies from reddish cupreous to bronzy green. Sometimes the pronotum is widest near the apical angles, with the sides rounded anteriorly, and obliquely converging from near the apical angles to the posterior angles. In a few of the specimens examined the lateral callosities on the abdominal sternites were distinctly indicated. The length is from 10 to 13 mm.

It is very difficult to separate this species from *carinipennis*. The male genitalia in *pseudotsugae* are more slender, with the sides of the median lobe strongly, obliquely narrowed to the apex, which is rather acutely rounded, whereas in *carinipennis* the genitalia are distinctly broader, with the sides of the median lobe slightly narrowed to the apex, which is broadly rounded. The dilation on the anterior tibia of the male of *carinipennis* is at least twice as long as wide, but in *pseudotsugae* the dilation is not twice as long as wide, and the tibia is more strongly constricted behind the dilation. The smooth spaces on the elytra are usually broader in *pseudotsugae* than in *carinipennis*. So far the writer has been unable satisfactorily to separate the females of these two species.

(85) CHRYSOBOTHRIS LIBONOTI Horn

(Fig. 81; fig. 123, *B*)

Chrysobothris libonoti Horn, 1886, Amer. Ent. Soc. Trans. 13: 104, 108, pl. 6, figs. 193–197; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 216; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 160; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 639.

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FIGURE 81.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris libonoti.*

Male.—Moderately elongate, slightly convex above, rather strongly shining, piceous, with a faint cupreous tinge; beneath cupreous, with a vague greenish reflection in certain lights, and more strongly shining than above.

Head bronzy green, slightly cupreous, with a distinct, smooth, longitudinal carina on occiput, and a distinct chevron on vertex; front slightly, irregularly depressed; surface subopaque, sparsely, coarsely, irregularly punctate, sparsely clothed with long, semierect, white hairs, intervals densely granulose; clypeus deeply, broadly, angularly emarginate in front, arcuately rounded on each side. Antenna uniformly coppery bronze, robust, strongly narrowed to apex; intermediate segments compact, as long as wide, broadly truncate at outer margins; third segment as long as the following two segments united.

Pronotum nearly twice as wide as long, wider at apex than at base, widest near apex; sides arcuately converging at apices, strongly, obliquely converging from near apices to posterior angles; anterior margin broadly, arcuately emarginate, without a median lobe; base arcuately emarginate on each side, median lobe moderately produced, truncate in front of scutellum; disk uneven, slightly convex, with a broad, deep, median sulcus, limited on each side by a broad, elongate, smooth space, and on each side a broad, irregular depression, with an oblique, smooth callosity in front of middle; surface finely, rather densely punctate in median sulcus, coarsely, confluently punctate toward sides, sparsely clothed with a few long, recumbent hairs.

Elytra slightly wider than pronotum, twice as long as wide; sides nearly parallel from humeral angles to apical third, then obliquely converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions broad and shallow; disk uneven, moderately convex; surface glabrous, finely, densely punctate between the smooth spaces. Each elytron with distinct, smooth costae; first parallel with sutural margin, strongly elevated posteriorly, dilated on basal half; second and third interrupted by the broad, shallow foveae, and dilated into more or less confluent, smooth spaces; fourth narrow, slightly elevated, following outline of lateral margin.

Abdomen beneath sparsely, finely fossulate-punctate, sparsely clothed with short, recumbent, white hairs, without distinct, elevated, smooth, lateral callosities, intervals nearly smooth, last visible sternite broadly, semicircularly

emarginate at apex, without a submarginal ridge, lateral margins not serrate, but interrupted at apical third; eighth tergite subtruncate at apex, densely granulose, coarsely, sparsely punctate, but not longitudinally carinate. Prosternum smooth at middle, densely, coarsely punctate in front and at sides, sparsely clothed with long, recumbent, whitish hairs; anterior margin subtruncate, without a median lobe. Anterior femur with a large, short, rather acute tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae arcuate, the former with a very small, acute tooth at apex, the latter with a series of small teeth on inner margin; posterior tibia straight.

Length 11.5 mm., width 4.5 mm.

Redescribed from the male lectotype, No. 3445, in the Academy of Natural Sciences of Philadelphia.

Female.—Differing from the male in having the front of the head uniformly purplish brown, more coarsely, sparsely punctate, with numerous irregular, smooth callosities, and the intervals smooth, the antenna uniformly purplish brown, the prosternum more sparsely pubescent, the last visible sternite more elongate, tridentate at apex, with the median tooth frequently longer than outer teeth, and the anterior and middle tibiae unarmed.

Type locality.—Arizona, no definite locality.

DISTRIBUTION

From material examined:

ARIZONA: No definite locality, type material (H. K. Morrison). Sabino Canyon, November 1923 (G. Hofer). Huachuca Mountains (C. Schaeffer). Palmeriee, Cochise County, June 15 (Biedermann). Carr Canyon, Huachuca Mountains, August 1905 (H. Skinner).

Chamberlin (1926) records the species from Gallinas Canyon, New Mexico.

Hosts.—The larval habits are unknown, but the adults have been collected on Mexican blue oak (*Quercus oblongifolia* Torrey) in Arizona by George Hofer.

Very little variation was observed in the specimens examined except in length, which ranges from 9.5 to 13 mm.

Horn (1886) described the species from material collected by H. K. Morrison in Arizona, and states that he did not find any differences in the tibia of the two sexes, but in the males the anterior tibia is armed with a very small tooth at the apex, and the middle tibia with a series of small teeth on the inner margin, whereas in the female the anterior and middle tibiae are unarmed.

(86) CHRYSOBOTHRIS COSTIFRONS Waterhouse

(Fig. 82; fig. 123, *C*)

Chrysobothris aerea Horn (not Chevrolat), 1886, Amer. Ent. Soc. Trans. 13: 103, 104–105, pl. 6, figs. 173–177; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 137 (part); Leng and Mutchler, 1933, Cat. Coleopt., sup. 2–3, p. 29.

Chrysobothris costifrons Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, p. 45, pl. 3, fig. 19, 1889, p. 184; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 210; Schaeffer, 1909, Brooklyn Inst. Arts and Sci., Mus., Sci. Bul. 1: 376; Leng, 1920, Cat. Coleopt., p. 182; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 617.

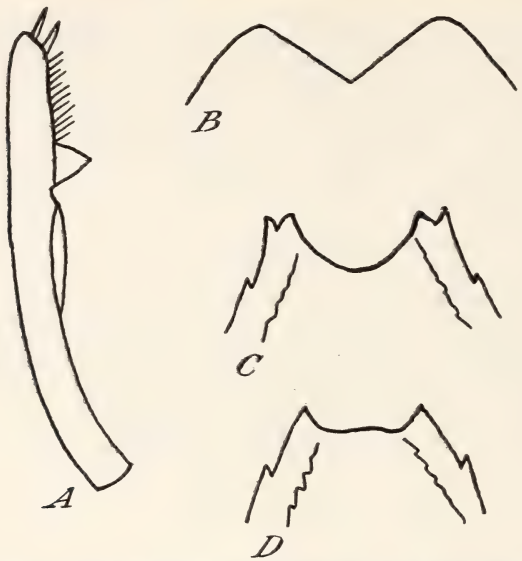

FIGURE 82.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris costifrons*.

Male.—Moderately elongate, slightly convex above, moderately shining, piceous on smooth spaces, faintly cupreous in punctured areas; beneath purplish brown, with a faint bronzy tinge, and more strongly shining than above.

Head uniformly bronzy brown, with a smooth, longitudinal carina on occiput; front flat; surface coarsely, irregularly, confluently punctate on front, finely punctate on occiput and clypeus, sparsely clothed with rather long, semierect, white hairs; clypeus broadly, deeply, angularly emarginate in front, arcuately rounded on each side. Antenna brownish cupreous, gradually narrowed to apex; intermediate segments compact, as long as wide, broadly truncate at outer margins; third segment nearly as long as following three segments united.

Pronotum nearly twice as wide as long, narrower at apex than at base, widest near apex; sides obliquely converging at apices, slightly obliquely converging from near apices to posterior angles; anterior margin broadly, arcuately emarginate, without a median lobe; base broadly, arcuately emarginate on each side, median lobe broadly rounded, and subtruncate in front of scutellum; disk moderately convex, slightly uneven, with a smooth median line, a vague depression on each side near lateral margin, a broad, irregular depression near base opposite middle of each elytron, and with a few small, irregular, smooth callosities near apical angles; surface sparsely, finely, irregularly punctate at middle, coarsely, confluently punctate and more or less rugose at sides.

Elytra distinctly wider than pronotum, twice as long as wide; sides obliquely converging (more strongly posteriorly) from humeral angles to tips, which are separately acutely angulated; lateral margins coarsely serrate; basal depressions broad, moderately deep; humeral depressions broad and shallow; surface glabrous, slightly uneven, finely, densely, irregularly punctate between costae. Each elytron with four smooth, elevated costae, first distinct, moderately elevated, extending from apex to basal third; second and third less distinct, broadly interrupted, connected to each other by irregular, smooth, elevated spaces; fourth barely indicated on apical half, following outline of lateral margin; and with a densely punctured discal fovea interrupting second costa in front of middle, and surrounded by an elevated, smooth border.

Abdomen beneath coarsely, rather densely, irregularly fossulate-puncture at middle, more or less rugose at sides, sparsely clothed at sides with short, recumbent, white hairs, with indistinct, smooth, lateral callosities, intervals nearly smooth; basal sternite slightly, longitudinally concave and obsoletely punctate at middle; last visible sternite with a short, flat, smooth, median carina on basal half, and a slightly elevated, serrate, submarginal ridge, semicircularly emarginate at

apex, the angles prominent and bidentate, and the lateral margins not serrate, but interrupted at apical thirds; eighth tergite coarsely, densely punctate, broadly rounded at apex. Prosternum gibbose on each side along anterior margin, smooth at middle, coarsely, irregularly punctate, somewhat rugose, and densely clothed with long, erect, white hairs at sides; anterior margin slightly arcuate, but without a median lobe. Anterior femur with a large, acute-angulated tooth, which is not dentate on outer margin. Anterior tibia slightly arcuate, with a small, triangular tooth at apical fourth, distinctly notched behind tooth; middle and posterior tibiae with a number of small teeth on inner margins.

Length 18 mm., width 7 mm.

Female.—Differing from the male in having the front of the head more coarsely punctate, and with numerous small, irregular, smooth callosities, the last visible sternite broadly, shallowly, arcuately emarginate at apex (the emargination sinuate at bottom), and with the smooth median carina longer, the eighth tergite confluently punctate, and the anterior and middle tibiae nearly straight, and all of the tibiae unarmed.

Redescribed from a male topotype (No. 1) from Arizona, in the Academy of Natural Sciences of Philadelphia.

Type locality.—Northern Sonora, Mexico (by present designation). Lectotype in the British Museum.

DISTRIBUTION

From material examined:

ARIZONA: No definite locality (H. K. Morrison). Oracle, July 4, reared (Hubbard and Schwarz). Sabino Basin, Santa Catalina Mountains, September (C. H. T. Townsend). Santa Catalina Mountains and Redington, reared (M. Chrisman). Miller's Canyon, Huachuca Mountains, April–July (Brooklyn Mus. coll.). Palmerlee, May 25 (Biedermann). Carr Canyon, Huachuca Mountains, Cochise County, August 1905 (H. Skinner).
MEXICO: No definite locality.

Waterhouse (1887, 1889) records it from Amula in Guerrero, Oaxaca, and Orizaba, Mexico, and Chamberlin (1926) from Nogales, Ariz.

Hosts.—This species has been cut from Emory oak (*Quercus emoryi* Torrey) in Arizona by Hubbard and Schwarz, and has been reared by Kirk from white oak (*Quercus arizonica* Sargent) collected at Redington and in the Santa Catalina Mountains, Ariz., by M. Chrisman. Chamberlin (1926) records it from greasewood, but this record was taken from an erroneously labeled specimen in the United States National Museum, and the original notes under the number on the specimen state that it was reared from white oak.

The sculpture and coloration are rather constant in the specimens examined, except on the head, where the sculpture and pubescence are slightly variable. The smooth callosities on the pronotum are more numerous in some specimens than in others, and frequently the lateral callosities on the abdominal sternites are replaced by numerous small, irregular, smooth spaces. The length is from 14 to 22 mm.

Horn (1886) figured and gave a redescription of what he thought was *aerea* described by Chevrolat, and stated:

> My first specimen was given me by Dr. C. A. Dohrn, of Stettin, since which others have been collected by Morrison in Arizona. On comparison with the Saunders collection now in the British Museum it bore the name *costifrons* Chevr.

Horn, being somewhat in doubt regarding the status of *costifrons*, communicated with his friend Sallé, who sent him a specimen of *Chrysobothris aerea* Chevr. (*mexicana* Dej.) with the following re-

marks: "The *C. costifrons* Chevr. is very near to *aerea*, but the elytral impressions are more rounded and brilliant golden." From these comments Horn was satisfied that the characters referred to by Sallé were purely varietal, and that *costifrons* could not be considered a distinct species, so he used *aerea* and cited the species as occurring in Arizona, and extending as far south as Oaxaca, Mexico.

Waterhouse (1887) states that the unique type of *aerea* is in the British Museum, and that it differs from the species referred to by Horn, so he describes *aerea* Horn (not Chevrolat) using *costifrons* Chevr., a manuscript name. He gives the habitat as North America, Arizona (Morrison), and Mexico, north Sonora (Morrison), Orizaba (Sallé), and Oaxaca. The Arizona and Oaxaca localities are cited from Horn's article.

There has been much confusion regarding the specimens collected by H. K. Morrison and labeled Sonora and Arizona. Schwarz (Proc. Ent. Soc. Wash. 4: 209, 1899), commenting on the collections made by Morrison, remarked as follows:

> Morrison's sets, when sent abroad, were usually labeled Sonora and have thus been included in the Biologia Centrali-Americana. When sent to American workers, however, they are labeled Arizona. They were probably all collected, however, in the Graham Mountains near Fort Grant, and above Fort Huachuca, Arizona.

Since the specimens sold by Morrison to LeConte, Horn, Schwarz, the British Museum, etc., are probably all topotypes, I am herewith designating the specimen in the British Museum collected by Morrison and listed by Waterhouse in his description from northern Sonora as the lectotype.

(87) CHRYSOBOTHRIS TRANQUEBARICA (Gmelin)

(Fig. 83; fig. 123, *D*)

Buprestis impressa Fabricius, 1787 (not Fabricius 1775), Mantissa Insect., v. 1, p. 182.

Buprestis tranquebarica Gmelin, 1788, Systema Nat., v. 1, pt. 4, p. 1932 (new name for *impressa* Fabricius 1787).

Buprestis excavata Olivier, 1790, Encyc. Méthodique, Insectes, v. 5, p. 232 (new name for *impressa* Fabricius 1787); Fabricius, 1792, Ent. System., v. 1, pt. 2, p. 206; 1801, Systema Eleutheratorum, v. 2, p. 205.

Chrysobothris impressa Eschscholtz, 1829, Zool. Atlas, v. 1, p. 9 (separate, p. 8); Horn, 1886, Amer. Ent. Soc. Trans. 13: 69, 109–110, pl. 6, figs. 198–202; Snyder, 1916, Jour. Econ. Ent. 9: 452.

Chrysobothris rugosa Mannerheim, 1837, Soc. Imp. Nat. Moscou Bul. 10 (8): 74–75.

Chrysobothris fraterna Mannerheim, 1837, Soc. Imp. Nat. Moscou Bul. 10 (8): 75–76.

Chrysobothris denticulata Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, p. 46, pl. 8, fig. 62, addenda p. 7.

Chrysobothris denticollis Gory, 1840, Monog. Buprestides, sup. 4, p. 178, pl. 30, fig. 173.

Chrysobothris tranquebarica Fisher, 1919, Ent. Soc. Wash. Proc. (1918) 20: 173–177; Snyder, 1919, Jour. Agr. Res. 16: 155–163, pls. 18–21, text figs. 1–2; Fisher, 1925, U. S. Natl. Mus. Proc. 65 (9): 96–99; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 174 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 654–655.

Chrysobothris chalcophoroides Smith (not Horn), 1887, Ent. Amer. 3: 39 (misidentification); Schwarz, 1888, Ent. Soc. Wash. Proc. 1: 93 (correction).

The list of citations to the literature is not complete, only the more important ones being listed.

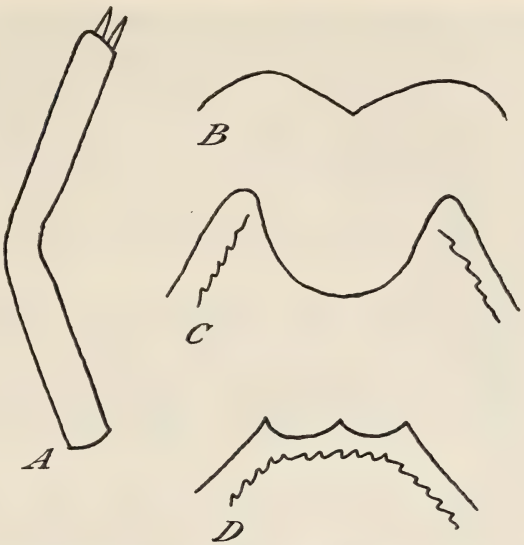

FIGURE 83.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris tranquebarica.*

Male.—Broadly elongate, rather strongly depressed above, moderately shining, piceous, with faint greenish and cupreous tinges; beneath piceous, with greenish and purplish reflections in certain lights, and more strongly shining than above.

Head bright reddish cupreous, bright green on clypeus, with a strong, elevated, transverse carina on vertex, and an obsolete, irregular, transverse carina (which is broadly interrupted at middle) midway between vertex and clypeus; front very uneven, broadly, deeply depressed behind clypeus; surface coarsely, confluently punctate, rather densely clothed with short, erect, inconspicuous hairs; eyes nearly contiguous on occiput; clypeus strongly elevated, broadly, deeply, angularly emarginate in front, arcuately rounded on each side. Antenna bronzy green, with a golden tinge, becoming blackish toward outer margins of segments, strongly narrowed to apex; intermediate segments compact, quadrate, as long as wide, broadly truncate at outer margins; third segment broad, slightly longer than following two segments united.

Pronotum twice as wide as long, narrower at apex than at base, widest along middle; sides strongly, obliquely converging anteriorly, parallel and distinctly sinuate along middle, strongly converging and broadly, arcuately emarginate along basal third; anterior margin broadly, deeply, arcuately emarginate, without a median lobe; base deeply, arcuately emarginate on each side, median lobe slightly produced, subtruncate in front of scutellum; disk moderately convex, uneven, with a shallow, elongate, median depression, and four or five more or less distinct depressions on each side; surface coarsely, densely, uniformly punctate, with a few short, erect, inconspicuous hairs toward sides. Scutellum long, and acute posteriorly.

Elytra slightly wider than pronotum, two-thirds longer than wide; sides nearly parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal depressions narrow and deep; humeral depressions rounded and moderately deep; surface glabrous, densely, finely punctate between costae. Each elytron with four more or less distinct costae; first strongly elevated from apex to basal third, then continuing as a smooth line to base; second distinctly elevated, extending from near base to posterior fovea, interrupted by anterior fovea; third slightly indicated in front of posterior fovea; fourth only indicated near apex; and with two obcordate foveae, one at basal third interrupting second costa, the other at apical third between second and fourth costae.

Abdomen beneath rather densely fossulate-punctate, sparsely clothed with long, recumbent hairs, without distinct, elevated, lateral callosities, intervals nearly smooth; basal sternite broadly depressed at middle; last visible sternite

deeply, arcuately emarginate at apex, with the angles narrowly rounded, and with a strongly elevated, serrate, submarginal ridge, lateral margins not serrate; eighth tergite coarsely, sparsely punctate, densely granulose, with dorsal margin broadly subtruncate. Prosternum sparsely punctate, transversely rugose, sparsely clothed with moderately long, semierect hairs; anterior margin with a very narrow, inconspicuous, median lobe. Anterior femur with a short, obtusely rounded tooth, which is coarsely dentate on outer margin, and with a small, triangular tooth behind the larger tooth. Anterior tibia strongly arcuate, suddenly bent at middle; middle tibia strongly arcuate; posterior tibia straight. Length 14 mm., width 6.5 mm.

Redescribed from a male from Miami Beach, Fla., in the United States National Museum.

Female.—Differing from the male in having the head piceous, with distinct greenish and purplish tinges, and a transverse chevron on the occiput, the antenna brownish cupreous, the last visible abdominal sternite shallowly, arcuately emarginate at apex, with the exterior angles acute and strongly produced, and strongly sinuate at middle of emargination, the eighth abdominal tergite more coarsely, confluently punctate, and broadly rounded at apex, the anterior femur without a small triangular tooth, and the anterior and middle tibiae less arcuate.

Type locality.—Of *tranquebarica*, "Tranquebariae"; present location of type unknown to writer. Of *fraterna*, Puerto Rico, and of *rugosa*, locality unknown: types in the Zoological Museum, University of Helsingfors. Of *denticulata*, Guadeloupe; type in collection of René Oberthür. Of *denticollis*, Bogota, Colombia; type in Reiche collection (supposed to be in the Natural History Museum, Geneva, Switzerland).

DISTRIBUTION

From material examined:

FLORIDA: Key West, April 1887 (Hubbard and Schwarz). Miami, April to June, reared; Hobe Sound, May 16, 1916 (T. E. Snyder). Paradise Key (C. A. Mosier). West Lake, near Cape Sable, February 25.

WEST INDIES: Guadeloupe, St. Thomas, Grenada, Puerto Rico, Bahamas, Haiti, and Dominican Republic.

It has been recorded in the literature from Elliott Key, along Biscayne Bay, and Key Biscayne, Fla. Chamberlin (1926) and Obenberger (1934) record it from Cuba, but the writer has not seen any specimens of this species from that island, all the specimens labeled *tranquebarica* being *tumida*.

Hosts.—This species has been reared from Australian-pine (*Casuarina equisetifolia* Foster) and red mangrove (*Rhizophora mangle* Linnaeus) in Florida by T. E. Snyder. Chamberlin (1926) records it from buttonwood (*Conocarpus erecta* Linnaeus), but this host-plant record should be verified. Russo collected the adults on the trunk of "canafistola (*Cassia fistula*)" in the Dominican Republic. The natural host plant seems to be the red mangrove, as adults were collected in Florida before the "Australian pine" was introduced into that region.

The sculpture is rather uniform, but the color of the foveae on the elytra varies from lilacinous through reddish cupreous to viridian. Some of the specimens examined have more or less distinct, smooth, flat callosities at the sides of the abdominal sternites. Usually the median lobe on the prosternum is slightly indicated, but occasionally specimens are found with the anterior margin of the prosternum truncate, without any indications of a median lobe. The length is from 12 to 16.5 mm.

Fabricius (1775) described *Buprestis impressa* from "Indiis" and in 1787 described a species under the same name from "Tranquebariae." Gmelin (1788) proposed the new name *tranquebarica* for the species described in 1787 by Fabricius. Two years later Olivier (1790) proposed the new name *excavata* for the same species, and this name was used by Fabricius in all his later works. Mannerheim (1837) described *Chrysobothris fraterna* from Porto Rico, and also *rugosa* from an unknown locality. In the same year Castelnau and Gory described *denticulata* from Guadeloupe, but in the addenda placed it as a synonym of *fraterna.* From the descriptions, and from material examined from the type localities, *fraterna*, *rugosa*, and *denticulata* are synonyms of *tranquebarica.* Chamberlin (1926) places *tumida* Chevrolat as a synonym of this species, but this is an error, as *tumida* is a valid species, and so far is only recorded from Cuba, and probably all the Cuban records of *tranquebarica* should be referred to *tumida.* Gory (1840) described *Chrysobothris denticollis* from Colombia, and it has been placed as a synonym of *tranquebarica*, but there is some doubt about this synonymy and the type should be examined before the synonymy is accepted. "Australian pine borer" has been adopted as the common name for this species by the American Association of Economic Entomologists.

(88) Chrysobothris acuminata LeConte

(Fig. 84; fig. 123, *E*)

Chrysobothris acuminata LeConte, 1859, Amer. Phil. Soc. Trans. 11: 237; 1881, Amer. Ent. Soc. Trans. 9: xxxvi.

Chrysobothris acutipennis Horn, 1886, Amer. Ent. Soc. Trans. 13: 104, 107–108 (part); Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, pp. 42–43; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 136 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 608 (part); Knull, 1937, Ent. News 48: 38.

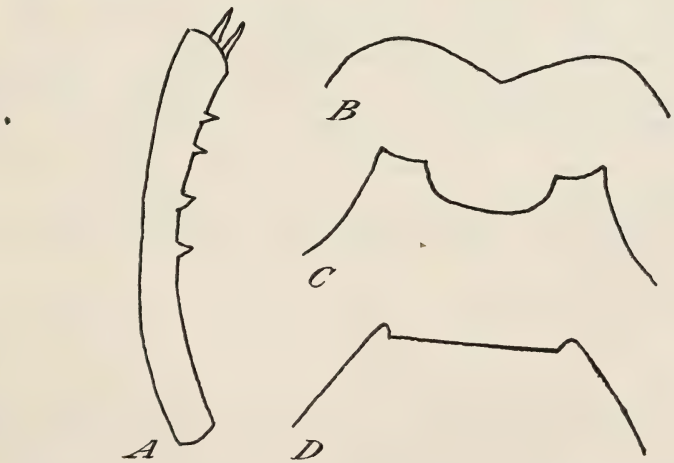

Figure 84.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris acuminata.*

Male.—Moderately elongate, rather strongly depressed above, moderately shining, piceous, with distinct greenish and purplish reflections in different lights; beneath dark bronzy green, with a distinct purplish tinge, and more strongly shining than above.

Head brownish cupreous, with a narrow, smooth, longitudinal carina on occiput, the carina arcuately bifurcate on vertex; front flat, broadly, transversely depressed behind clypeus; surface finely, deeply, confluently punctate, somewhat granulose, rather densely clothed with long, erect, inconspicuous, white hairs; clypeus broadly, rather deeply, angularly emarginate in front, arcuately rounded on each side. Antenna bronzy green on basal segments, testaceous on apical segments, slightly narrowed to apex; intermediate segments compact, quadrate, broadly truncate at outer margins; third segment as long as following three segments united.

Pronotum nearly twice as wide as long, wider at base than at apex, widest at apical third; sides arcuately converging anteriorly, obliquely converging from apical third to posterior angles; anterior margin arcuately emarginate, with a vague, arcuate, median lobe; base broadly, arcuately emarginate on each side, median lobe slightly produced, and truncate in front of scutellum; disk moderately convex, with a vague, broad, median, longitudinal depression, and three broad, moderately deep depressions on each side, a transverse one near anterior margin, a round one near base, and an oblique one behind apical angle; surface sparsely, finely punctate at middle, coarsely, confluently punctate at sides, sparsely clothed toward sides with short, erect hairs. Scutellum long, and acute posteriorly.

Elytra distinctly wider than pronotum at apical third, twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately narrowly rounded, with a minute tooth at apex; lateral margins slightly serrate; basal depressions broad and very deep; humeral depressions broad and moderately deep; surface slightly convex, finely, irregularly, confluently punctate, without conspicuous pubescence. Each elytron with four more or less distinct, smooth, longitudinal costae; first extending from base to apex, strongly elevated on apical two-thirds, becoming obsolete near base; second extending from basal third to near apex; third short, extending from posterior fovea to near humerus; fourth following outline of lateral margin, distinct on apical third, becoming obsolete anteriorly; and with three slightly bronzy foveae, the first transverse at apical third between second and fourth costae, more or less interrupting the second costa, the second in front of middle between first and third costae, and a very small spot a little more anterior between first and second costae.

Abdomen beneath finely, sparsely, irregularly fossulate-punctate, rather densely clothed at sides with short, recumbent, white hairs, broadly, feebly flattened at middle, with vaguely indicated lateral callosities, intervals vaguely granulose; last visible sternite deeply, subquadrangularly emarginate at apex, with the angle on each side broad and slightly emarginate, broadly, longitudinally concave at middle, the concavity limited on each side by a vague carina, with an obscure submarginal ridge, but lateral margins not serrate; eighth tergite sparsely, coarsely punctate, rounded at apex. Prosternum smooth at middle, finely, densely punctate at sides, sparsely clothed with long, erect, whitish hairs; anterior margin truncate, without a median lobe. Anterior femur with a short, acutely triangular tooth, which is distinctly dentate on outer margin. Anterior and middle tibiae arcuate, slightly dilated at apices and armed with a series of very minute teeth on inner margins; posterior tibia straight.

Length 19 mm., width 6 mm.

Redescribed from the male lectotype, No. 3762, in the Museum of Comparative Zoology, Cambridge, Mass. Specimen not labeled with locality.

Female.—Differing from the male in having the front of the head bronzy brown, and more coarsely, irregularly punctate, the antenna uniformly bronzy brown, the last visible sternite more elongate, truncate at apex, with the angles obtusely produced, and with a strongly elevated median carina, and the anterior and middle tibiae feebly arcuate, and unarmed on their inner margins.

Type locality.—Tamaulipas to Matamoros, Mexico.

DISTRIBUTION

From material examined:

TEXAS: San Diego, April 3 to May 2 (E. A. Schwarz). Brownsville, June 8, 1934 (J. N. Knull). Cotulla, May 11, 1906 (F. C. Pratt). Corpus Christi, June 6, 1906 (C. R. Jones).

Host.—Knull (1937) records that adults were reared from dead branches of "*Acacia felicioides* Car." collected at Brownsville, Tex. The larvae work beneath the bark and enter the sapwood for pupation.

Very little variation was observed in the specimens examined except in size. The length is from 15 to 20 mm.

Specimen No. 1 (lectotype No. 3762) and specimen No. 2 (female paratype), which are without locality labels in the LeConte collection, are without any doubt the specimens mentioned in the original description as having been collected by Dr. Berlandière. LeConte described both sexes and gave the distribution as Tamaulipas, extending to Matamoros and probably into Texas, and the lectotype is labeled "*C. acuminata* Lec., Berlandière."

This species has been placed as a synonym of *acutipennis* Chevrolat, but it differs from *acutipennis* in being usually larger, and in having the foveae on the elytra smaller and more uniform in color with the rest of the surface, the elytra narrowly rounded at the apices, the tooth on the femur acutely triangular, and the apical segments of the antenna in the male testaceous and the front of the head without a projecting plate above the clypeus.

(89) CHRYSOBOTHRIS ACUTIPENNIS Chevrolat

(Fig. 85; fig. 123, *F*)

Chrysobothris acutipennis Chevrolat, 1835, Coléopt. du Mex. Cent., v. 2, fasc. 8, No. 190; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1423; Horn, 1886, Amer. Ent. Soc. Trans. 13: 104, 107–108, pl. 6, figs. 188–192 (part); Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, pp. 42–43, pl. 3, fig. 14, 1889, p. 184 (part); Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 328; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 136 (part); Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 608 (part).

Chrysobothris cupreosignata Thomson, 1878, Typi Buprestidarum, p. 80; Kerremans, 1884, Soc. Ent. de Belg. Ann. 28: 149 (separate, p. 35).

Chrysobothris cupreoaenea Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, pp. 39–40, pl. 7, fig. 55.

Male.—Moderately elongate, rather strongly depressed above, strongly shining, piceous, with a distinct greenish tinge in different lights, cupreous in the foveae on elytra; beneath brownish cupreous, violaceous blue along margins of sternites and on tarsi, more strongly shining than above.

Head uniformly brownish cupreous, with a narrow, longitudinal carina on occiput, and a small, distinctly elevated, transverse, projecting plate behind clypeus; front slightly uneven and convex, transversely depressed behind clypeus; surface coarsely, confluently fossulate-punctate, longitudinally rugose, rather densely clothed with long, erect, whitish hairs; clypeus broadly, shallowly, arcuately emarginate in front, arcuately rounded on each side. Antenna uniformly brownish cupreous, with a distinct golden tinge, slightly narrowed to apex; intermediate segments compact, quadrate, slightly wider than long, broadly subtruncate at outer margins; third segment slightly longer than following three segments united.

Pronotum nearly twice as wide as long, narrower at apex than at base, widest near apex; sides arcuately converging at apical angles, obliquely converging and more or less sinuate from near apical angles to posterior angles, which are

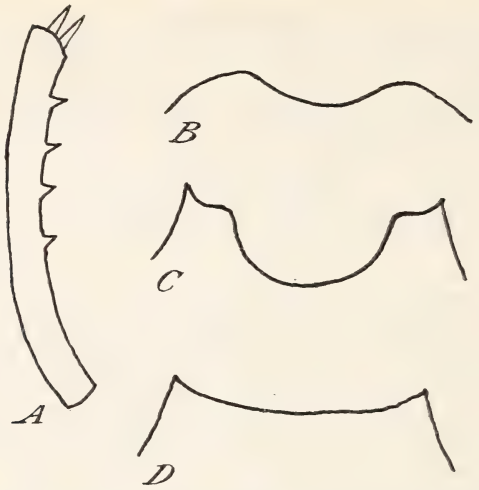

FIGURE 85.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*), and of female (*D*) of *Chrysobothris acutipennis*.

rectangular; anterior margin slightly, arcuately emarginate, with a vague median lobe; base arcuately emarginate on each side; median lobe slightly produced, and vaguely, arcuately emarginate in front of scutellum; disk moderately convex, with three more or less distinct, shallow depressions on each side; surface sparsely, coarsely, irregularly punctate, sparsely clothed with short, recumbent, whitish hairs, intervals obsoletely granulose. Scutellum long, acute posteriorly.

Elytra distinctly wider than pronotum, twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately acutely produced; lateral margins coarsely serrate; surface glabrous, finely, densely, irregularly punctate, confluently punctate in foveae. Each elytron with four more or less distinct, smooth, longitudinal costae; first extending from apex to near base, strongly elevated on apical half, becoming obsolete near base; second moderately elevated, extending from middle to near apex; third short, interrupted by postmedian fovea; fourth following outline of lateral margin, distinctly elevated posteriorly, but becoming obsolete toward humerus; and with two large, distinct, transverse foveae, one in front of middle between first and third costae, the other at apical third between first and fourth costae.

Abdomen beneath sparsely, coarsely, irregularly fossulate-punctate, sparsely clothed with short, recumbent, whitish hairs, without lateral callosities, intervals obsoletely granulose; last visible sternite deeply, semicircularly emarginate at apex, with the angle on each side broad, slightly emarginate and acutely produced externally, the surface broadly, longitudinally concave at middle, the concavity limited on each side by a longitudinal carina, and with a slightly elevated, serrate, submarginal ridge, lateral margins not serrate; eighth tergite coarsely, sparsely punctate, broadly subtruncate at apex. Prosternum broadly depressed behind anterior margin, sparsely, finely, irregularly punctate, sparsely clothed with long, semierect hairs; anterior margin deflexed, subtruncate, without a distinct median lobe. Anterior femur with a short, obtusely rounded tooth, which is slightly crenulate on outer margin. Anterior and middle tibiae strongly arcuate, each armed with a number of minute teeth on inner margins; posterior tibia straight.

Length 14 mm., width 5.25 mm.

Redescribed from a male from Brownsville, Tex., in the United States National Museum.

Female.—Differing from the male in having the front of the head more sparsely, irregularly punctate, with numerous irregular, smooth callosities, the last visible sternite more elongate, longitudinally carinate at middle, broadly, shallowly emarginate at the apex, and with the angles acutely produced, the eighth abdominal tergite more coarsely, densely punctate, and broadly rounded at apex, and the anterior and middle tibiae unarmed on their inner margins.

Type locality.—Of *acutipennis*, "Tuspan, Mexico." (This is probably Tuxpam on the coast between Tampico and Vera Cruz); type in the British Museum. Of *cupreosignata*, Mexico, and of *cupreoaenea*, Cayenne, French Guiana; types in the collection of René Oberthür.

DISTRIBUTION

From material examined:

TEXAS: Brownsville, February and March, reared (W. H. Anderson).
PANAMA: Old Panama, January 31, 1911 (Aug. Busck). San Felin (G. C. Champion). Santiago, April 14.
NICARAGUA: Labeled "Ometepe, Nicaragua, Shimek."
COSTA RICA: La Caja, near San Jose, altitude 900 meters, June 1931 (M. Valerio). Rosario, December 17, 1933 (J. M. Peralta).
MEXICO: Almolonga, State of Vera Cruz, November.

Also recorded in the literature from Arizona and Lower California, and from various localities in Mexico, British Honduras, Guatemala, Nicaragua, Panama, Venezuela, and Guiana.

Host.—Adults have been reared from larvae collected in Texas ebony (*Pithecellobium flexicaule* (Bentham) Coulter) at Brownsville, Tex., by W. H. Anderson. James Zetek reports this species as doing very serious damage to orange and lime trees at Santiago, Panama.

The sculpture is rather constant but the color on the dorsal surface of the body varies from olivaceous green to bluish or greenish black, and in the densely punctured areas from olivaceous green to a brilliant reddish cupreous. The length is from 13.5 to 16.5 mm.

(90) CHRYSOBOTHRIS MERKELII Horn

(Fig. 86; fig. 124, *A*)

Chrysobothis merkelii Horn, 1886, Amer. Ent. Soc. Trans. 13: 104, 106–107, pl. 6, figs. 183–187; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 118; Van Dyke, 1902, N. Y. Ent. Soc. Jour. 10: 173; Woodworth, 1913, Guide to California Insects, pp. 194, 196; Van Dyke, 1917, Pacific Coast Ent. Soc. Proc. 1: (pages not numbered); Burke, 1918, Jour. Econ. Ent. 11: 211; Van Dyke, 1918, Ent. News 29: 58; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 163; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 641–642.

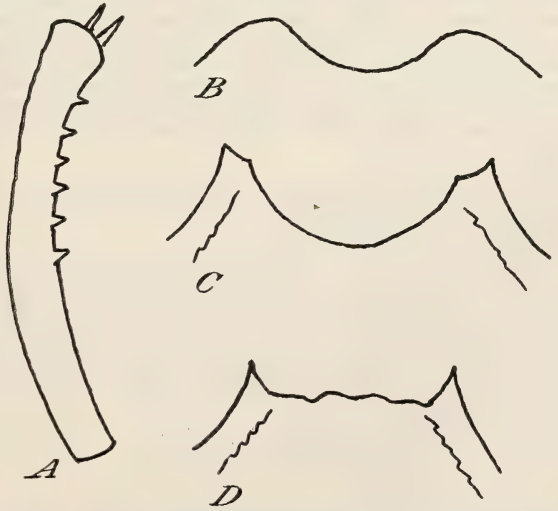

FIGURE 86.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris merkelii*.

Female.—Broadly elongate, moderately convex above, rather strongly shining, piceous, with a faint purplish or bronzy reflection; beneath cupreous, with a faint greenish tinge, bluish black along margins of abdominal sternites, and more strongly shining than above.

Head cupreous, piceous on elevations, with a distinct, smooth, longitudinal carina on occiput, and two broad, transversely biarcuate, smooth callosities, one behind antenna, the other above middle; front flat and uneven; surface coarsely, densely punctate, except on callosities, densely clothed with long, semierect, white hairs; clypeus broadly, deeply, arcuately emarginate in front, arcuately rounded on each side. Antenna brownish cupreous, with a faint bronzy tinge, slightly narrowed to apex; intermediate segments compact, as wide as long, broadly truncate at outer margins; third segment nearly as long as following four segments united.

Pronotum twice as wide as long, narrower at apex than at base, widest at apical third; sides strongly, arcuately converging near apical angles, obliquely converging and slightly sinuate from apical third to posterior angles; anterior margin arcuately emarginate, without a median lobe; base indistinctly, arcuately emarginate on each side, median lobe slightly produced, subtruncate in front of scutellum; disk moderately convex, without a median depression or smooth callosities, but with three vague depressions on each side, one near anterior margin, one near base, and the other near apical angle; surface finely, sparsely punctate at middle, coarsely, confluently punctate and rugose at sides, sparsely clothed with long, inconspicuous, erect hairs, intervals smooth. Scutellum long, acute posteriorly.

Elytra wider than pronotum, nearly twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are narrowly rounded; lateral margins coarsely serrate; basal depressions broad and deep; surface glabrous, finely, densely, irregularly punctate. Each elytron with four distinctly elevated, smooth, longitudinal costae; first extending from apex to basal depression; second joining fourth near apex, extending forward to outside of basal depression; third extending from a cordate fovea at apical third forward to outside of humerus; fourth more obscurely elevated than the others, and following outline of lateral margin; and with two indistinct discal foveae, one in front of middle interrupting second costa, and one behind middle between second and third costae.

Abdomen beneath coarsely fossulate-punctate, sparsely at middle and more densely at sides, rather densely clothed at sides with long, semierect, white hairs, intervals obsoletely granulose; sternites vaguely, broadly, longitudinally depressed at middle, smooth along anterior and posterior margins, and with indistinct lateral callosities; last visible sternite transversely sinuate at apex, with the angles acutely produced, longitudinally carinate at middle, and with a distinctly elevated, serrate, submarginal ridge, lateral margins not serrate, but slightly sinuate at apical third; eighth tergite coarsely, confluently punctate, densely granulose, broadly rounded at apex. Prosternum transversely depressed along anterior margin, coarsely, sparsely punctate, sparsely clothed with long, erect, white hairs; anterior margin truncate, strongly deflexed, without a median lobe. Anterior femur with a short, acute tooth, which is sinuate on outer margin. Anterior and middle tibiae slightly arcuate, unarmed; posterior tibia straight.

Length 17.5 mm., width 8 mm.

Redescribed from the female lectotype, No. 3444, in the Academy of Natural Sciences of Philadelphia.

Male.—Differing from the female in having the front of the head more finely, confluently punctate, with a short, serrate, transverse, strongly elevated carina behind clypeus, the outer segments of the antenna reddish cupreous, the last visible abdominal sternite broadly, longitudinally depressed at middle, and nearly semicircularly emarginate at apex, with the angles strongly produced and obliquely truncate, the eighth abdominal tergite more coarsely, sparsely punctate, and the anterior and middle tibiae armed with a series of small teeth on their inner margins.

Type locality.—Texas, no definite locality.

DISTRIBUTION

From material examined:

ARIZONA: Sabino Canyon, reared (Geo. Hofer). Hot Springs, June 22 (Hubbard and Schwarz). Redington, August 9, 1915 (M. Chrisman). Santa Rita

Mountains, April 12, 1935 (G. P. Engelhardt); July 7 (Hubbard and Schwarz). Globe; Roosevelt Lake (D. K. Duncan).
CALIFORNIA: San Bernardino County, May–July; Los Angeles County (D. W. Coquillett). Banning, May–July (H. F. Wickham). Cabazon, June 21, 1909 (E. D. Ball).
TEXAS: Brownsville, June 7, 1904 (H. S. Barber).
LOWER CALIFORNIA: San Felipe (G. Beyer).

Horn described the species from material collected in Texas and Arizona by Aug. Merkel, and Chamberlin (1926) designated the type locality as Texas.

Hosts.—Adults were reared from mesquite collected at Sabino Canyon, Ariz., by Geo. Hofer. Burke (1918) records the species as mining the bark, sapwood, and heartwood of dying and dead stumps, limbs, and trees of catclaw (*Acacia greggii* Gray) and mesquite (*Prosopis juliflora* (Swartz) De Candolle) in Arizona, and states that it may kill the trees. Young adults were taken from the wood during February. Van Dyke (1917) reports collecting many adults of this species in California, in burned mesquite bushes in a section of a valley which had been burned off by the Indians.

The sculpture and coloration on the dorsal surface of the body are rather constant in the specimens examined, but the emargination on the anterior margin of the clypeus is variable in depth, and in a few specimens seen is very weak. The sides of the pronotum are sometimes slightly sinuate posteriorly, and occasionally the transverse carina on the front of the head in the male is indistinct. The length is from 15 to 19.5 mm.

(91) CHRYSOBOTHRIS GEMMATA LeConte

(Fig. 87; fig. 124, *B*)

Chrysobothris gemmata LeConte, 1858, Acad. Nat. Sci. Phila. Proc., p. 67; 1858, Acad. Nat. Sci. Phila. Jour. (ser. 2) 4: 34; 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 237; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1425; Horn, 1886, Amer. Ent. Soc. Trans. 13: 104, 105–106, pl. 6, figs. 178–182; Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, p. 36; Van Dyke, 1918, Ent. News 29: 58; Burke, 1918, Jour. Econ. Ent. 11: 211; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 156; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 634.

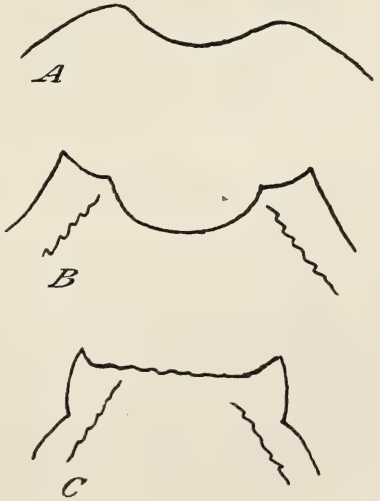

FIGURE 87.—Clypeus (*A*), and last visible abdominal sternite of male (*B*) and of female (*C*) of *Chrysobothris gemmata.*

Female.—Moderately elongate, rather strongly depressed above, subopaque, purplish, with greenish reflections on pronotum, and elytra ornamented with golden-green foveae; beneath bright green, with more or less purplish reflections, especially at sides, and more strongly shining than above.

Head bright green, with distinct, irregular, purplish spaces, a small, irregular, smooth spot on front, and a smooth, longitudinal carina on occiput; front slightly convex, broadly, transversely depressed behind clypeus, uneven; surface coarsely, deeply, irregularly punctate on median part, more finely, densely punctate at sides, sparsely clothed, especially at sides, with moderately long, recumbent, inconspicuous hairs; clypeus broadly, shallowly, arcuately emarginate in front, slightly rounded on each side. Antenna purplish black, with a vague greenish reflection, gradually narrowed to apex; intermediate segments compact, subquadrate, as long as wide, broadly truncate at outer margins; third segment as long as following three segments united.

Pronotum nearly twice as wide as long, wider at base than at apex, widest at apical third; sides arcuately converging near apical angles, obliquely converging from apical third to posterior angles, which are rectangular; anterior margin transversely subtruncate; base arcuately emarginate on each side, median lobe slightly produced, and broadly truncate in front of scutellum; disk moderately convex, with a vague, longitudinal, median depression in front, and three broad, shallow depressions on each side; surface sparsely, finely punctate at middle, coarsely, confluently punctate and more or less rugose at sides, sparsely clothed at sides with very short, erect hairs. Scutellum long, acuminate posteriorly.

Elytra at base slightly wider than pronotum at apical third, twice as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal depressions broad, deep, and golden green; humeral depressions broad and shallow; surface glabrous, moderately convex, deeply, densely, finely, uniformly punctate. Each elytron with four smooth, narrow, straight costae; first extending from base to apex; second extending from base to near apex, strongly elevated on apical half, barely indicated basally; third short, interrupted posteriorly by postmedian fovea; fourth strongly elevated on apical third, slightly elevated basally, extending from apex to humeral angle, and following outline of lateral margin; and with three densely punctured, depressed, golden-green, discal foveae, first in front of middle interrupting second costa, second at apical third between second and fourth costae, and third near apex between first and second costae.

Abdomen beneath sparsely, irregularly fossulate-punctate, very sparsely clothed with short, recumbent, white hairs, broadly, slightly flattened at middle, with more or less distinct, smooth, lateral callosities, intervals smooth; last visible sternite sinuately truncate at apex, with angles acutely produced, longitudinally carinate at middle, with a coarsely serrate submarginal ridge, but the lateral margins not serrate; eighth tergite coarsely, densely punctate, broadly rounded at apex. Prosternum transversely depressed along anterior margin, very sparsely, finely, irregularly punctate, sparsely clothed at sides with short, semierect, white hairs; anterior margin truncate, without a median lobe. Anterior femur with a short, acutely triangular tooth, which is indistinctly crenulate on outer margin. Anterior tibia slightly arcuate, unarmed; middle and posterior tibiae nearly straight.

Length 20 mm., width 8 mm.

Redescribed from the female lectotype, No. 2704, in the Museum of Comparative Zoology, Cambridge, Mass.

Male.—Differing from the female in having the front of the head golden green, more finely punctured and more densely pubescent, the antenna purplish black except three basal segments, which are bronzy green, and the intermediate segments slightly longer than wide, the last visible abdominal sternite broadly, longitudinally concave at middle, deeply, arcuately emarginate at apex, with the angle on each side broad and slightly emarginate, the eighth abdominal tergite more sparsely punctured, and the anterior and middle tibiae strongly arcuate, slightly expanded at apices, and armed on their inner margins with a number of small teeth.

Type locality.—Sonora, Mexico. Lectotype simply labeled with a small disk.

DISTRIBUTION

From material examined:

ARIZONA: Sabino Canyon, reared (G. Hofer). Santa Catalina Mountains, reared (M. Chrisman); August 12, 1914 (B. R. Coad). San Bernardino Ranch, Cochise County, 3,700 feet, August 9–18, 1905 (E. G. Smyth, F. H. Snow). Redington, 1915 (M. Chrisman). Santa Rita Mountains (D. K. Duncan).
MEXICO: Sonora, types (Arthur Schott).

Also recorded in the literature by Chamberlin (1926) as follows:

ARIZONA: Douglas, Pinal Mountains, and Yuma.
NEW MEXICO: No definite locality.

LeConte (1858) described the species from two females collected by Arthur Schott in Sonora, Mexico, but in his Revision of the Buprestidae (1859) he states that the two specimens were collected by Mr. Schott in Arizona.

Hosts.—The adults have been reared from mesquite (*Prosopis juliflora* (Swartz) De Candolle) collected in Sabino Canyon and the Santa Catalina Mountains, Ariz., by Geo. Hofer and Mr. Chrisman. Burke (1918) records it mining the bark, sapwood, and heartwood of dying and dead limbs and trunks of mesquite in Arizona, and reports that it may kill entire trees and cause severe injury to the wood. Chamberlin (1926) records a specimen in the United States National Museum bearing the label "reared from *Quercus alba*." This specimen is erroneously labeled, and the notes show that it was reared from mesquite.

Very little variation was observed in the specimens examined, except that the foveae on the elytra vary in color from bright green or golden green to reddish cupreous, and frequently the costae on the elytra become obsolete in the basal regions. The length is from 19 to 22 mm.

(92) CHRYSOBOTHRIS WICKHAMI, new species

(Fig. 88)

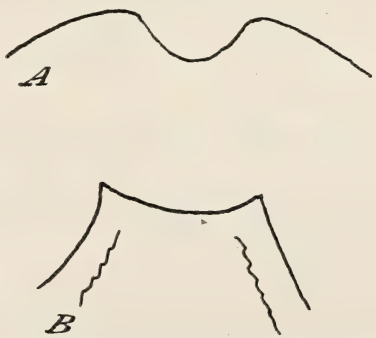

FIGURE 88.—Clypeus (*A*) and last visible abdominal sternite (*B*) of female of *Chrysobothris wickhami.*

Female.—Resembling *Chrysobothris acuminata* LeConte, but the females differing from the females of that species as follows: Body more brownish cupreous above and beneath; head with a round depression behind clypeus; clypeus nearly semicircularly emarginate in front, subtruncate on each side; antenna more slender, with intermediate segments slightly longer than wide; pronotum without a distinct median depression; elytra reddish cupreous, conjointly

broadly rounded at tips, with the second costa on each elytron joined to the fourth near apex, and not interrupted by the foveae, each elytron with six reddish-cupreous foveae, a large, rather strongly depressed one behind third costa, and five small, slightly depressed foveae, one at apical fourth between first and second costae, one just behind humerus, and three in front of middle between first and fourth costae; last visible abdominal sternite broadly, shallowly, arcuately emarginate at apex; eighth abdominal tergite confluently punctate; and anterior femur more slender, with a long, acute tooth.

Length 19–21 mm., width 7–8 mm.

Male.—Unknown.

Type locality.—Yuma, Ariz.

Described from three females (one type). The type was collected at the type locality during 1899 by H. Broun; one paratype was collected at the same locality by H. F. Wickham, and the other paratype was collected at Phoenix, Ariz., by D. K. Duncan.

Type and paratype.—In the United States National Museum, No. 55297. Paratype in the collection of J. R. Helfer.

(93) CHRYSOBOTHRIS CHALCOPHOROIDES Horn

(Fig. 89)

Chrysobothris chalcophoroides Horn, 1886, Amer. Ent. Soc. Trans. 13: 109, 110–111, pl. 6, figs. 203–206; Smith, 1887, Ent. Amer. 3: 39 (erroneous identification, =*tranquebarica*); Schwarz, 1888, Ent. Soc. Wash. Proc. 1: 93 (*tranquebarica*); Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 209; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 142; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 615.

FIGURE 89.—Clypeus (*A*) and last visible abdominal sternite (*B*) of female of *Chrysobothris chalcophoroides.*

Female.—Broadly elongate, moderately convex above, faintly shining, uniformly piceous on elevations, slightly cupreous in depressions, beneath brownish cupreous, more strongly shining than above.

Head uniformly bronzy brown, with a broad, smooth, longitudinal carina on occiput, and two large, irregular, smooth callosities forming an irregular, transverse elevation on front; front uneven; surface finely, irregularly, confluently punctate, with numerous small, smooth elevations behind clypeus, and sparsely clothed with moderately long, recumbent, white hairs; clypeus broadly, deeply, angularly emarginate in front, arcuately rounded on each side. Antenna brownish cupreous, distinctly narrowed to apex; intermediate segments subtriangular, not compact, as long as wide, broadly subtruncate at outer margins; third segment as long as following three segments united.

Pronotum twice as wide as long, distinctly wider at base than at apex, widest near apex; sides strongly, obliquely converging at apex, slightly sinuate and obliquely converging from near apex to posterior angles; anterior margin deeply, arcuately emarginate, without a median lobe; base broadly, arcuately emarginate

on each side; with median lobe strongly produced and narrowly truncate in front of scutellum; disk uneven, slightly convex, flattened at middle, with a narrow, smooth, longitudinal, median line, numerous small, irregular, smooth callosities toward sides, a large, irregular callosity on each side near front, and another opposite middle of base of each elytron; surface densely, finely, irregularly punctate in depressions, punctures coarser and deeper toward sides. Scutellum short, triangular.

Elytra distinctly wider than pronotum, one and three-fourths times as long as wide, widest at humeral angles, which are broadly rounded; sides converging from humeral angles (more strongly on apical halves) to tips, which are conjointly broadly rounded; lateral margins slightly serrate; basal depressions broad and moderately deep; humeral depressions broad, shallow, and irregular; surface glabrous, uneven, depressed areas finely, densely, irregularly punctate. Each elytron with four more or less distinct, smooth, longitudinal costae; first narrow, extending from apex to base; second and third forming large, irregular, smooth callosities, some of which are connected to first costa; fourth costa narrow, irregular, following outline of lateral margin.

Abdomen beneath sparsely, coarsely, irregularly fossulate-punctate, sparsely clothed with short, recumbent, white hairs, with large, slightly elevated, smooth, lateral callosities, intervals nearly smooth; basal sternite broadly, longitudinally sulcate at middle; last visible sternite broadly, sinuately truncate at apex, with angles slightly produced, longitudinally carinate at middle, with a slightly serrate, submarginal ridge, lateral margins not serrate; eighth tergite densely punctate, broadly rounded at apex. Prosternum nearly smooth at middle, coarsely punctate and transversely rugose at sides and along anterior margin, sparsely clothed with rather short, recumbent, white hairs; anterior margin without a distinct median lobe. Anterior femur with a short, acutely triangular tooth, which is not distinctly dentate on outer margin. Anterior tibia slightly arcuate, unarmed at apex; middle and posterior tibiae straight.

Length 22 mm., width 10 mm.

Male.—Unknown.

Redescribed from the female holotype, No. 3446, in the Academy of Natural Sciences of Philadelphia.

Type locality.—"Arizona."

DISTRIBUTION

From material examined:

ARIZONA: No definite locality, type (F. G. Schaupp), Huachuca Mountains, May (United States National Museum. This is the specimen listed by Chamberlin (1926) as being in the Academy of Natural Sciences of Philadelphia). Josephine Saddle, Upper Madera Canyon, Santa Rita Mountains, 7,000 feet elevation, September 25, 1924 (Mason collection).

Also recorded by Chamberlin (1926) from Senator, Ariz., June 1, in the Leng Collection.

Host.—Chamberlin (1926) lists it from Arizona white oak (*Quercus arizonica* Sargent), but this host record should be verified, as it may refer to the Packard (1890) record for *chlorocephala*, erroneously listed by Chamberlin under *chalcophoroides*.

This species seems to be rare in collections, and the writer has examined only three specimens, all of which are females. The sculpture is rather peculiar for a *Chrysobothris*, as it resembles more closely that of some species of the genus *Chalcophora*. No variation worthy of mention was observed in the specimens examined.

(94) CHRYSOBOTHRIS BISPINOSA Schaeffer

(Fig. 90; fig. 124, *C*)

Chrysobothris bispinosa Schaeffer, 1909, Brooklyn Inst. Arts and Sci., Mus., Sci. Bul. 1: 376; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 140; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 612.

FIGURE 90.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris bispinosa*.

Female.—Rather broadly elongate, slightly convex above, subopaque, piceous, the punctures more or less cupreous; beneath brownish cupreous, with smooth spaces bluish black, and rather strongly shining.

Head uniformly brownish cupreous, with a broad, smooth, longitudinal carina on occiput, the carina longitudinally sulcate, and with two irregular, more or less interrupted, transverse, smooth spaces on front; front nearly flat; surface coarsely, densely, irregularly punctate, sparsely clothed with long, inconspicuous, semierect, cinereous hairs; clypeus deeply, angularly emarginate in front, broadly rounded on each side. Antenna uniformly reddish cupreous, gradually narrowed to apex; intermediate segments compact, as long as wide, subtruncate at outer margins; third segment as long as following three segments united.

Pronotum nearly twice as wide as long, narrower at apex than at base, widest near apex; sides arcuately converging at apical angles, obliquely converging from near apical angles to posterior angles; anterior margin broadly, arcuately emarginate, without a median lobe; base broadly, arcuately emarginate on each side, median lobe moderately produced, truncate in front of scutellum; disk evenly convex, without depressions; surface rather finely, irregularly punctate at middle, more coarsely, confluently punctate at sides, sparsely clothed at sides with short, inconspicuous hairs. Scutellum short, triangular.

Elytra distinctly wider than pronotum at base, widest near base, twice as long as wide; sides arcuately converging from humeral angles to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal depressions deep; humeral depressions broad and moderately deep; surface glabrous, finely, densely, irregularly punctate. Each elytron with three more or less distinct costae; first distinct, extending from apex to basal third; second and third irregular, more or less interrupted, connected to each other by irregular, transverse, smooth spaces; and with two moderately large, densely punctured foveae between first and third costae, one at basal third, the other just behind middle.

Abdomen beneath coarsely, irregularly fossulate-punctate at middle, confluently punctate at sides, sparsely clothed with long, recumbent, whitish hairs, slightly, longitudinally flattened at middle, without lateral callosities, intervals obsoletely granulose; last visible sternite deeply, narrowly, arcuately emarginate at apex, with angles acute and projecting, with a smooth, longitudinal, median carina, and a slightly elevated, serrate, submarginal ridge, lateral margins not serrate; eighth tergite coarsely, densely punctate, strongly serrate and broadly rounded at apex. Prosternum nearly smooth at middle, coarsely, irregularly punctate at sides, rather densely clothed with long, recumbent, whitish hairs; anterior margin arcuately rounded, without a distinct median lobe. Anterior femur with a short, acute tooth, which is not dentate on outer margin. Anterior tibia slightly arcuate, unarmed; middle and posterior tibiae straight.

Length 17 mm., width 7.75 mm.

Redescribed from the type in the United States National Museum.

Male.—Differing from the female in having the last visible abdominal sternite deeply, semicircularly emarginate at apex, with the angles broad and slightly emarginate and without a smooth, longitudinal carina, the eighth abdominal tergite more broadly rounded at apex and the surface more sparsely punctured, the anterior tibia armed with a triangular tooth near apex and with a number of very small teeth on inner margin, and the middle and posterior tibiae armed with a row of small, distinct teeth on their inner margins.

Type locality.—Nogales, Santa Cruz County, Ariz.

Host.—Unknown.

Schaeffer described this species from a single female collected August 18, 1906, at the type locality by F. W. Nunenmacher. The only other specimen examined by the writer is a male collected October 3 in the Huachuca Mountains, Ariz., by D. J. and J. N. Knull. This species resembles *serripes* Schaeffer, but the female differs from the female of that species in having the last visible abdominal sternite deeply, narrowly, arcately emarginate at the apex, and the male in having the median lobe of the genitalia coarsely serrate on the lateral margins.

(95) CHRYSOBOTHRIS SERRIPES Schaeffer

(Fig. 91; fig. 124, *D*)

Chrysobothris serripes Schaeffer, 1905, Brooklyn Inst. Arts and Sci., Mus., Sci. Bul. (1) 6: 130–131; 1909 (15): 376; Chamberlin, 1926, Cat. Buprestidae North America, p. 170.

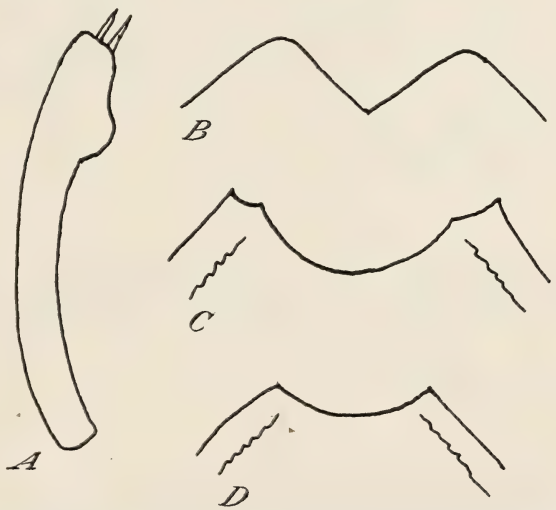

FIGURE 91.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris serripes.*

Male.—Rather broadly elongate, moderately convex above, rather strongly shining, piceous, with distinct purplish and greenish tinges in certain lights, faintly bronzy green in foveae on elytra; beneath purplish cupreous (legs slightly darker) and more strongly shining than above.

Head greenish and purplish brown, with a smooth, longitudinal carina on occiput, the carina longitudinally sulcate and slightly bifurcate on vertex; front nearly flat; surface coarsely, confluently punctate, sparsely clothed with long, semierect, inconspicuous, whitish hairs; clypeus deeply, triangularly emarginate in front, arcately rounded on each side. Antenna uniformly brownish cupreous.

slightly narrowed to apex; intermediate segments compact, subtriangular, as long as wide, subtruncate at outer margins; third segment as long as following three segments united.

Pronotum twice as wide as long, slightly narrower at apex than at base, widest near apex; sides arcuately converging at apical angles, obliquely converging and slightly sinuate from near angles to posterior angles; anterior margin slightly, broadly, arcuately emarginate, without a distinct median lobe; base broadly, arcuately emarginate on each side, median lobe slightly produced, and broadly truncate in front of scutellum; disk slightly flattened at middle, on each side a very shallow, oblique depression near apical angle, and a round, indistinct depression near base; surface rather sparsely, irregularly punctate at middle, more densely and coarsely punctate at sides, with a smooth median line, and an inconspicuous, smooth space on each side near anterior margin and median line. Scutellum short, triangular.

Elytra distinctly wider than pronotum, widest at apical third, nearly twice as long as wide; sides slightly diverging from humeral angles to apical third, then obliquely converging to tips, which are conjointly broadly rounded, lateral margins slightly serrate posteriorly; basal depressions broad and deep; humeral depressions indistinct; surface glabrous, finely, irregularly punctate, more densely in the foveae. Each elytron with four more or less distinct longitudinal costae; first straight, extending from base to apex, strongly elevated posteriorly; second sinuate, slightly elevated, interrupted in front of middle and at apical third by foveae; third short, indistinct, interrupted by foveae; fourth irregularly elevated, following outline of lateral margin; and with two slightly depressed, transverse, irregular foveae, one just in front of middle, the other at apical third.

Abdomen beneath coarsely, irregularly punctate, more densely toward sides, sparsely clothed with short, recumbent, whitish hairs, without distinct lateral callosities, intervals obsoletely granulose; basal sternite broadly flattened at middle; last visible sternite semicircularly emarginate at apex, angles narrowly, obliquely truncate; with a slightly elevated, serrate, submarginal ridge, lateral margins not serrate; eighth tergite coarsely, sparsely punctate, broadly rounded at apex. Prosternum coarsely, sparsely punctate at middle, more densely at sides and along anterior margin, sparsely clothed with short, recumbent, whitish hairs; anterior margin truncate, without a median lobe. Anterior femur with a short, obtuse tooth, which is not distinctly dentate on outer margin. Anterior tibia strongly arcuate, with a small, rounded tooth near apex; anterior and middle tibiae with numerous small teeth on inner margins, the middle tibia strongly arcuate and the posterior one straight.

Length 15 mm., width 6.5 mm.

Redescribed from the male type in the United States National Museum.

Female.—Differing from the male in having the front of the head more convex, uniformly purplish brown, more coarsely punctate, and with numerous irregular, smooth callosities, the last visible sternite more elongate, broadly, shallowly, arcuately emarginate at apex, with a distinct, serrate, preapical ridge, the anterior and middle tibiae slightly arcuate, and all the tibiae unarmed on inner margins.

Type locality.—Beaver Canyon, Utah.

DISTRIBUTION

From material examined.

ARIZONA: Williams, June 10 to July 29 (Barber and Schwarz).
COLORADO: North Cheyenne Canyon, August 10, 1916 (Geo. Hofer). Manitou, July 19, 1900 (H. F. Wickham).
NEW MEXICO: Albuquerque, June 16, 1909 (F. C. Pratt). Las Vegas.
UTAH: Beaver Canyon, July 1904, type (Jacob Doll). "S. W. Utah" (Brooklyn Museum collection).

Schaeffer (1909) records the species as having been collected at Oak Creek, Ariz., by Professor Snow.

Hosts.—Nothing is known of the larval habits of this species, but the adults have been collected by George Hofer in Colorado, and by Barber and Schwarz in Arizona on the Rocky Mountain white oak

(*Quercus utahensis* (De Candolle) Rydberg, synonym *gambelii* Nuttall).

Very little variation was observed in the specimens examined except in color and size. The foveae on the elytra vary in color from bronzy green to reddish cupreous, but sometimes they are concolorous with the rest of the surface. In some specimens the sides of the pronotum are parallel and more or less sinuate along the middle. The prosternum is usually sparsely punctured at the middle, but occasionally a specimen is found in which the middle of the prosternum is impunctate. The length is from 14 to 17.5 mm.

(96) Chrysobothris analis LeConte

(Fig. 92; fig. 124, *E*)

Chrysobothris analis LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 238; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1423; Crotch, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 90; Horn, 1886, Amer. Ent. Soc. Trans. 13: 109, 111–112, pl. 7, figs. 207–211; Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, p. 40; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 206; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 137–138; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 609–610.

Chrysobothris austinii Thomson, 1878, Typi Buprestidarum, pp. 78–79; Kerremans, 1884, Soc. Ent. de Belg. Ann. 28: 149 (separate, p. 35).

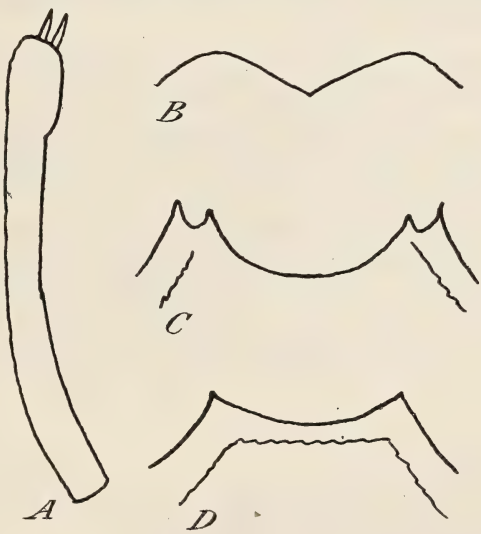

Figure 92.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris analis*.

Male.—Moderately elongate, slightly convex above, moderately shining, uniformly blackish green, with a distinct purplish tinge; beneath blackish green at middle, purplish at sides and on legs, slightly violaceous on tarsi, and more strongly shining than above.

Head uniformly brownish cupreous, with a smooth, longitudinal carina on occiput, the carina bifurcate on vertex; front nearly flat; surface coarsely, densely, rather deeply punctate, sparsely clothed with moderately long, semierect, white hairs, intervals vaguely granulose; clypeus broadly, deeply, angularly emarginate in front, slightly rounded on each side. Antenna purplish cupreous, gradually narrowed to apex; intermediate segments compact, slightly wider than long, broadly subtruncate at outer margins; third segment nearly as long as following three segments united.

Pronotum nearly twice as wide as long, slightly wider at base than at apex; sides slightly, arcuately converging at anterior angles, parallel and slightly sinuate from near anterior angles to posterior angles; anterior margin slightly, arcuately emarginate, with a slightly rounded median lobe; base broadly emarginate on each side, median lobe slightly produced, and broadly truncate in front of scutellum; disk moderately convex, without depressions or callosities; surface coarsely, transversely rugose, finely granulose, sparsely, finely punctate between rugae.

Elytra distinctly wider than pronotum, twice as long as wide, widest behind middle; sides nearly parallel from humeral angles to apical third (slightly expanded behind middle), then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and shallow; humeral depressions barely indicated; surface glabrous, coarsely but not densely punctate apically, becoming more densely punctate and obscurely, transversely rugose basally. Each elytron with a few broad, indistinct, longitudinal costae, the first slightly elevated on apical half, the others obsolete or only indicated by smooth lines, and with a broad, indistinct, transverse depression in front of middle.

Abdomen beneath coarsely, sparsely, irregularly fossulate-punctate, very sparsely pubescent, with obscurely indicated lateral callosities, intervals indistinctly granulose; last visible sternite broadly, deeply, arcuately emarginate at apex, the angle on each side bidentate, and with a serrate, submarginal ridge, but lateral margins not serrate; eighth tergite coarsely, densely punctate, broadly rounded at apex. Prosternum coarsely, densely, deeply punctate, sparsely clothed with short, semierect, white hairs; anterior margin with a distinct, rather long, median lobe. Anterior femur with a rather acute tooth, which is dentate on outer margin. Anterior tibia slightly arcuate, with a narrow, indistinct dilation at apex; middle and posterior tibiae straight.

Length 8 mm., width 3.25 mm.

Redescribed from the male lectotype, No. 2703, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—Similar to the male but differing from it in having the last visible sternite more shallowly emarginate at apex, with the angle on each side not bidentate, and with a distinct, transverse, serrate, anteapical ridge, and the anterior tibia unarmed at apex.

Type locality.—Of *analis*, Matamoros, Mexico; lectotype simply labelled with a dark-red disk. Of *austinii*, Mexico, no definite locality; type supposed to be in the René Oberthür collection, but has not been examined by the writer. Chamberlin (1926) gives the type locality as "Texas (Rio Grande)" but LeConte described the species from specimens collected by Dr. Berlandière at Matamoros, Mexico.

DISTRIBUTION

From material examined:

ARIZONA: Sabino Canyon, April 19, 1940 (P. W. Oman).
NEW MEXICO: San Antonio, June 20, 1908, reared (Hastings collection).
MEXICO: Matamoros, type (Dr. Berlandière).
TEXAS: Brownsville, April–June (numerous collectors). Columbus, June 6; Devil's River, May 3, 1907 (E. A. Schwarz). Cameron County, September (H. F. Wickham). San Diego, May 7 (Hubbard and Schwarz). Victoria, June 15, 1909 (J. D. Mitchell).

Waterhouse (1887) records the species from Orizaba and Yucatan, Mexico, and also from Guatemala.

Hosts.—Found breeding in pecan (*Hicoria pecan* (Marshall) Britton) at Brownsville, Tex., by D. K. McMillan, and in horsebean (*Parkinsonia aculeata* Linnaeus) and *Mimosa lindheimeri* Gray in the same locality by H. S. Barber. The adults have been collected on catclaw (*Acacia greggii* Gray) in Texas by E. A. Schwarz. A

specimen in the United States National Museum from San Antonio, N. Mex., is labeled as having been reared from peach (*Amygdalus persica* Linnaeus).

This species shows very little variation except in size and coloration. The color on the dorsal surface of the body varies from violaceous blue, through all shades of green, to olivaceous green. The tooth on the anterior femur is usually rather long and more or less acute, but occasionally specimens are found with the tooth short and obtusely rounded. The length is from 6 to 9.5 mm.

(97) CHRYSOBOTHRIS CHRYSOELA (Illiger)

(Fig. 93; fig. 124, *F*)

Buprestis chrysoela Illiger, 1800, *in* Wiedemann, Arch. f. Zool., v. 1, pt. 2, pp. 122–123.

Chrysobothris chrysoela Saunders, 1871, Cat. Buprestidarum, p. 96; Provancher, 1877, Nat. Canad. 9: 312–313; Schwarz, 1878, Amer. Phil. Soc. Proc. 17: 451; Horn, 1886, Amer. Ent. Soc. Trans. 13: 109, 114–115, pl. 7, figs. 227–231; Schwarz, 1888, Ent. Soc. Wash. Proc. 1: 93; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 209; Fiske, 1902, Ga. State Hort. Soc. Proc. 26: 75, fig. 7; Manee, 1913, Ent. News 24: 170; Blatchley, 1917, Canad. Ent. 49: 239; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 143; Knull, 1927, Ent. News 38: 115; 1930, Ent. News 41: 83; Obenberger, 1926, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 615–616; Brimley, 1938, Insects of North Carolina, p. 172.

Buprestis hybernata Fabricius, 1801, Systema Ent., v. 2, p. 209; Schönherr, 1817, Synonymia Insect., v. 1, pt. 3, p. 236; Say, 1836, Amer. Phil. Soc. Trans. 6: 158.

Chrysobothris hybernata Dejean, 1833, Cat. Coleopt., ed. 2, p. 80, 1836, ed. 3, p. 90; Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, pp. 16–17, pl. 4, fig. 24; Mannerheim, 1837, Soc. Imp. Nat. Moscou Bul. 10 (8): 78–79; LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 238.

Chrysobothris mellicula Dejean, 1833, Cat. Coleopt., ed. 2, p. 80, 1836, ed. 3, p. 90 (no description).

Chrysobothris viridipunctata Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, p. 21, pl. 4, fig. 31; LeConte, 1857, Acad. Nat. Sci. Phila. Proc. [9]: 8; 1873, Acad. Nat. Sci. Phila. Proc. [25]: 332.

The list of citations to the literature is not complete, only the more important ones being listed.

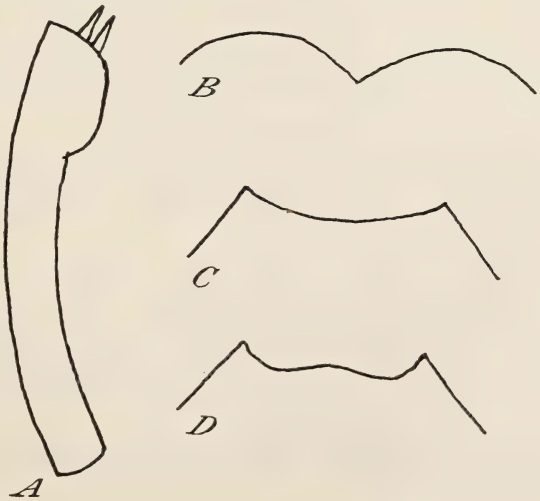

FIGURE 93.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris chrysoela*.

Male.—Broadly elongate, moderately convex above, rather strongly shining, purplish black, and each elytron with five golden-green spots; beneath purplish black, with a faint greenish reflection, more strongly shining than above.

Head bronzy black in front, becoming bronzy green toward clypeus, and bluish black on occiput, with a narrow, smooth, longitudinal carina on occiput, connected anteriorly to a transversely arcuate carina on vertex; front flat; surface coarsely, deeply, confluently ocellate-punctate, sparsely clothed with short, semierect hairs; clypeus broadly, deeply, angularly emarginate in front, arcuately rounded on each side. Antenna cupreous, slightly bronzy, gradually narrowed to apex; intermediate segments compact, slightly wider than long, broadly subtruncate at outer margins; third segment subequal in length to following three segments united.

Pronotum twice as wide as long, wider at base than at apex, widest near apex; sides obliquely truncated at apical angles, slightly sinuate and obliquely converging from near apical angles to posterior angles; anterior margin arcuately emarginate, with an indistinct, broadly rounded, median lobe; base arcuately emarginate on each side, median lobe slightly produced, broadly subtruncate in front of scutellum; disk uniformly convex, without depressions or callosities; surface coarsely, deeply, sparsely punctate, more densely punctate at sides, intervals densely granulose.

Elytra distinctly wider than pronotum, nearly twice as long as wide, widest behind middle; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are conjointly broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions obsolete; surface glabrous, without longitudinal costae, rather densely, finely, uniformly punctate, intervals finely granulose, and each elytron with five round, golden-green spots as follows: One in basal depression, a large depressed one at middle, one slightly in front of median one at lateral margin, and two situated transversely at apical third.

Abdomen beneath very coarsely, sparsely punctate, clothed with a few short hairs, without lateral callosities, intervals finely granulose; last visible sternite broadly, shallowly, arcuately emarginate at apex, without a submarginal ridge, lateral margins not serrate; eighth tergite densely granulose, coarsely, sparsely punctate, broadly rounded at apex. Prosternum coarsely, densely punctate, transversely rugose, sparsely pubescent; anterior margin truncate, with an indistinct, short, broad, median lobe. Anterior femur with a large, acute tooth, which is not dentate on outer margin. Anterior tibia arcuate, with a slight dilation at apex; middle tibia slightly arcuate, and slightly expanded at apex; posterior tibia straight.

Length 8 mm., width 3.5 mm.

Redescribed from a male in the United States National Museum, collected at Ft. Valley, Ga., April 4, 1921, by E. R. Selkregg.

Female.—Differing from the male in having the front of the head uniformly greenish black, with the punctures purplish, the last visible sternite usually sinuately truncate at apex, with the angles strongly produced, and the anterior tibia unarmed at apex.

Type locality.—Of *chrysoela*, Georgia; of *hybernata*, Carolina; of *mellicula*, North America; present location of the types of these three species unknown to the writer. Of *viridipunctata*, North America; type supposed to be in the collection of René Oberthür, but has not been examined by the writer.

Distribution.—This species is distributed throughout the Southern States and specimens have been examined from the District of Columbia and various localities in the following States: Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, and Virginia. It has been recorded by Provancher (1877) from St. Hyacinthe, Quebec, Canada, but this record may be from an erroneously identified specimen.

Hosts.—This species has been found breeding in buttonwood (*Conocarpus erecta* Linnaeus) at Key West, Fla., by E. A. Schwarz, and

has been reared from dead branches of southern cypress (*Taxodium distichum* (Linnaeus) Richard) and persimmon (*Diospyros virginiana* Linnaeus) collected in Virginia by J. N. Knull. Adults have been beaten from oak (*Quercus* sp.) and wax myrtle (*Myrica cerifera* Linnaeus) by W. S. Blatchley in Florida. A specimen in the National Museum from Baton Rouge, La., bears the following label: "Bred from dead fig" (*Ficus* sp.).

The color on the dorsal surface of the body varies from purplish black to reddish purple, and the spots on the elytra from golden green through all shades of green to reddish cupreous, and rarely the two apical spots on each elytron are connected transversely. The color on the front of the head in the males varies from bronzy green to bronzy black, sometimes with a distinct golden tinge, and in the females from greenish black, with the punctures purplish, to a uniform dark-green color. The emargination on the anterior margin of the clypeus is more or less variable in depth. The last visible abdominal sternite in the males is usually shallowly, arcuately emarginate at apex, whereas in a few specimens examined it was truncate, with the angles acutely produced, and very similar to that of the female, and in other specimens it was simply truncate with the angles not prominent. Usually the females have a distinct, serrate, preapical ridge on the last visible abdominal sternite, but this is obsolete in a few of the specimens examined. The length is from 7 to 9.5 mm.

(98) Chrysobothris bimarginicollis Schaeffer

(Fig. 94; fig. 125, *A*)

Chrysobothris bimarginicollis Schaeffer, 1905, Brooklyn Inst. Arts and Sci., Mus., Sci. Bul. 1: 148; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 139; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 612.

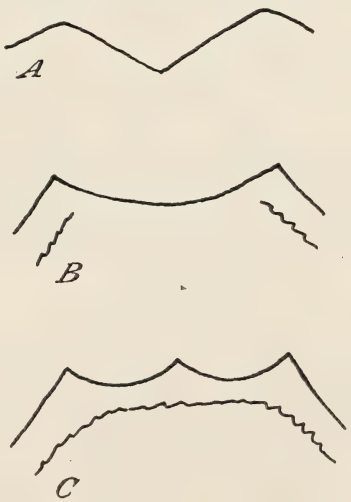

Figure 94.—Clypeus (*A*), and last visible abdominal sternite of male (*B*) and of female (*C*) of *Chrysobothris bimarginicollis*.

Male.—Moderately elongate, slightly convex above, subopaque, uniformly piceous, with a faint bronzy tinge; beneath piceous, with distinct purplish, greenish, and bronzy reflections in different lights, and more strongly shining than above.

Head brownish cupreous, golden green along anterior margin of clypeus, with a narrow, smooth, longitudinal carina on occiput; front flat; surface subopaque, densely, finely granulose, densely, coarsely, shallowly ocellate-punctate, sparsely, uniformly clothed with long, semierect, inconspicuous hairs; clypeus broadly, deeply, angularly emarginate in front, truncate on each side. Antenna brownish cupreous, with a faint bronzy tinge, gradually narrowed to apex; intermediate segments subtriangular, as long as wide, broadly rounded at outer margins; third segment as long as following three segments united.

Pronotum nearly twice as wide as long, slightly wider at base than at apex; sides slightly sinuate and parallel from near apical angles to posterior angles; anterior margin slightly sinuate, with a slightly rounded median lobe; base broadly, arcuately emarginate on each side, median lobe strongly produced, and truncate in front of scutellum; disk uniformly convex, without depressions or callosities, but with a vague, irregular, longitudinal ridge on each side along lateral margin; surface finely, densely, deeply, uniformly punctate, intervals densely, finely granulose.

Elytra distinctly wider than pronotum at base, nearly twice as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, coarsely, confluently punctate, more or less rugose basally, intervals finely, densely granulose. Each elytron with a more or less distinct longitudinal costa along sutural margin on apical half, the costa obliterated basally, and with three slightly depressed, more or less cupreous, discal foveae, one at middle, the other two at apical third.

Abdomen beneath coarsely, irregularly punctate, more densely at sides, sparsely, irregularly clothed with short, recumbent, whitish hairs, without distinct, smooth, lateral callosities, intervals finely granulose; last visible sternite broadly, shallowly, arcuately emarginate at apex, with an indistinct submarginal ridge on each side near apex, lateral margins not serrate; eighth tergite densely granulose, coarsely, densely punctate, broadly rounded at apex. Prosternum coarsely, confluently, shallowly punctate, sparsely clothed with short, erect, white hairs; anterior margin with a very narrow, obscure, median lobe. Anterior femur with a large, obtusely triangular tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae arcuate, unarmed; posterior tibia straight.

Length 8.5 mm., width 3.5 mm.

Redescribed from the male lectotype in the United States National Museum.

Female.—Resembling the male very closely but differing from it in having the head more deeply, coarsely punctate, and more sparsely pubescent, the last visible sternite bisinuate at apex, with the submarginal ridge serrate and strongly elevated behind the apex, and the eighth tergite confluently punctate.

Type locality.—Miller's Canyon, Huachuca Mountains, Ariz.

DISTRIBUTION

From material examined:

ARIZONA: Miller's Canyon, Huachuca Mountains, June–July, type series; Palmerlee, Cochise County, July 15 (C. Schaeffer).

Host.—The larval habits are unknown, but Charles Schaeffer collected the adults by beating branches of canyon live oak (*Quercus chrysolepis* Liebmann), which may be the host for this species.

Scarcely any variation was observed in the few specimens examined, except in size, the length ranging from 8 to 10.5 mm.

Schaeffer described the species from a series of specimens, without designating a holotype, so the male cotype in the United States

National Museum is herewith selected as the lectotype. He stated in his description that the middle tibia of the female is straight, but in the females in the type series the middle tibiae are slightly arcuate, but not so strongly as in the males.

(99) Chrysobothris fiskei, new species

(Fig. 125, *B*)

Resembles *Chrysobothris bimarginicollis* Schaeffer, but differs from that species as follows: Underside of body bright green at middle and purplish brown at sides; pronotum more sparsely, shallowly, irregularly punctate, with sides arcuately converging at basal halves; elytra widest behind middle, with the sides slightly diverging from humeral angles to behind middle, then obliquely converging to tips, which are conjointly broadly rounded, and each elytron with four more or less distinct, longitudinal costae and three distinct, bright-green or golden-green foveae; and male genitalia with sides of lateral lobes parallel near apices.

Length 9–10.5 mm., width 4–4.7 mm.

Type locality.—Montell, Tex.

Type material.—Type, allotype, and paratypes in the United States National Museum, No. 55298.

Described from five specimens (one male type), three males and two females, reared from Texas redbud (*Cercis reniformis* Engelmann), collected at the type locality by W. F. Fiske, to whom the writer takes great pleasure in dedicating the species.

(100) Chrysobothris azurea LeConte

(Fig. 95; fig. 125, *C*)

Chrysobothris azurea Dejean, 1883, Cat. Coléopt., ed. 2, p. 80, 1836, ed. 3, p. 90 (no description); LeConte, 1857, Acad. Nat. Sci. Phila. Proc. [9]: 8; 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 239; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1424; Zesch and Reinecke, 1880, North Amer. Ent. (Buffalo, N. Y.), vol. 1, app., p. vii; Lugger, 1884, Psyche 4: 203; Horn, 1886, Amer. Ent. Soc. Trans. 13: 109, 112–113, pl. 7, figs. 217–221; Leng, 1887, Ent. Amer. 2: 231; Blanchard, 1889, Ent. Amer. 5: 31; Chittenden, 1889, Ent. Amer. 5: 219; Hopkins, 1893, W. Va. Agr. Expt. Sta. Bul. 32: 183; Stromberg, 1894, Canad. Ent. 26: 37; Bowditch, 1896, Ent. News 7: 34; Scott and Fiske, 1902, U. S. Dept. Agr. Div. Ent. Bul. (n. s.) 31: 28; Felt, 1906, N. Y. State Mus. Mem. 8: 429, 467; Smith, 1910, N. J. State Mus. Rpt. (1909): 293; Blatchley, 1910, Coleoptera of Indiana, pp. 789, 791–792; Stoner, 1915, Ent. News 26: 126–127; Kwiat, 1915, Ent. News 26: 237; Nicolay, 1919, Brooklyn Ent. Soc. Bul. 14: 18–19; Knull, 1920, Ent. News 31: 6; Frost, 1920, Canad. Ent. 52: 28; Felt, 1924, Manual of Tree and Shrub Insects, p. 304.

Chrysobothris ultramarina Castelnau and Gory (not Say), 1836, Monog. Buprestides, v. 2, *Chrysobothris*, p. 13, pl. 3, fig. 19; Mannerheim, Soc. Imp. Nat. Moscou Bul. 10 (8): 79; Sturm, 1843, Cat. Käfer Sammlung, p. 61.

Chrysobothris lecontei Leng, 1920, Cat. Coleopt., p. 182 (*azurea* not preoccupied, new name not necessary); Knull, 1922, Canad. Ent. 54: 83; 1925, Ohio State Univ. Studies 2 (2): 28, 34; Criddle, 1926, Ent. Soc. Ontario Ann. Rpt. (1925) 56: 97; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 159–160; Leonard, 1928, N. Y. (Cornell) Agr. Expt. Sta. Mem. 101: 360; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 638–639. (New synonymy.)

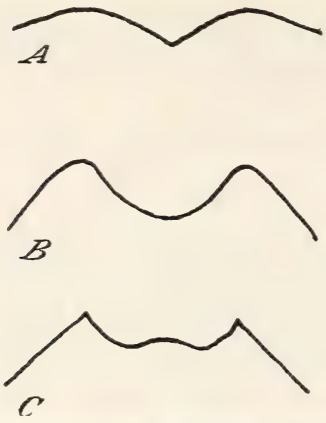

FIGURE 95.—Clypeus (*A*), and last visible abdominal sternite of male (*B*) and of female (*C*) of *Chrysobothris azurea.*

Female.—Broadly elongate, rather strongly depressed above, strongly shining, uniformly purplish blue above and beneath.

Head purplish blue, without a distinct, smooth, longitudinal carina on occiput; front nearly flat; surface coarsely, deeply, irregularly, confluently punctate, clothed with a few short, inconspicuous hairs; clypeus broadly, rather deeply, triangularly emarginate in front, subtruncate on each side. Antenna greenish, slightly narrowed to apex; intermediate segments compact, subtriangular, slightly wider than long, broadly rounded at outer margins; third segment as long as following three segments united.

Pronotum two-thirds wider than long, slightly wider at base than at apex, widest near base; sides arcuately converging at apical and posterior angles, parallel and distinctly sinuate at middle; anterior margin slightly, arcuately emarginate, without a distinct median lobe; base broadly, arcuately emarginate on each side, the median lobe strongly produced and broadly rounded; disk moderately convex, without depressions or callosities; surface coarsely, densely, deeply punctate, transversely rugose, intervals finely granulose.

Elytra distinctly wider than pronotum, widest behind middle, one and one-half times as long as wide; sides rather strongly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions broad and very shallow; surface glabrous, coarsely, densely, deeply punctate, more or less rugose at sides, intervals indistinctly granulose; each elytron with sutural and lateral costae represented by vaguely elevated, indistinct, longitudinal, but not smooth, lines, and with two very slightly depressed discal foveae, one in front of middle, the other at apical third, these foveae uniform in color with rest of surface.

Abdomen beneath sparsely, finely, irregularly punctate, slightly rugose at sides of basal sternites, sparsely clothed with short, inconspicuous hairs, without distinct, smooth, lateral callosities, intervals finely granulose; last visible sternite broadly, shallowly emarginate at apex, emargination transversely sinuate at middle, slightly, longitudinally carinate at middle, without a distinct submarginal ridge, lateral margins not serrate; eighth tergite densely, coarsely, deeply punctate, densely granulose, broadly rounded at apex. Prosternum coarsely, confluently punctate, transversely rugose, sparsely clothed with short, erect, brownish hairs, without a distinct median lobe. Anterior femur with a large triangular tooth, which is dentate on outer margin. Anterior and middle tibiae slightly arcuate, unarmed at apices; posterior tibia straight.

Length 7.5 mm., width 3.5 mm.

Redescribed from the female labeled Type No. 2706 and with an orange disk (which signifies Southern States) in the Museum of Comparative Zoology, Cambridge, Mass. This specimen is labeled by LeConte "C. azurea *Lec. ultramarina* Lap.," and is the specimen from

which he published his redescription in 1859, but this specimen is not the true type.

Male.—Differing from the female in having the head green, becoming cupreous or purplish on the occiput, the antenna bronzy green, with a golden tinge, the last visible sternite broadly, deeply, arcuately emarginate at apex, and more indistinctly carinate at middle, the eighth tergite coarsely, sparsely punctate, and the anterior and middle tibiae more strongly arcuate.

Type locality.—"North America," probably from a specimen sent to Dejean by the elder LeConte from Georgia; present location of type unknown to the writer.

Distribution.—Material has been examined from the District of Columbia, and from various localities in the following States: Connecticut, Georgia, Illinois, Iowa, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Virginia, and West Virginia.

The species is also recorded in the literature from Texas by Horn (1886), from Indiana by Blatchley (1910), from Manitoba, Canada, by Criddle (1926), and from Maine by Chamberlin (1926).

Hosts.—Specimens have been examined that were reared from hickory (*Hicoria* sp.), maple (*Acer* sp.), smooth sumac (*Rhus glabra* Linnaeus), and dead grape. It is recorded in the literature as having been reared from scarlet oak (*Quercus coccinea* Muenchhausen), swamp white oak (*Quercus bicolor* Willdenow), white or gray birch (*Betula populifolia* Marsh), smooth alder (*Alnus rugosa* (DuRoi) Spreng), wistaria (*Wistaria chinensis* DC.), and pine (*Pinus* sp.), and the adults have been collected on dogwood (*Cornus florida* Linnaeus), poison ivy (*Rhus toxicodendron* Linnaeus), basswood, or linden (*Tilia glabra* Ventenat), gray dogwood (*Cornus paniculata* L'Her.), thorn (*Crataegus* sp.), willow (*Salix* sp.), peach, and plum.

The color on the dorsal surface of the body varies from violaceous blue to purple, with all intermediate shades, and the underside of the body is frequently bright green at the middle, becoming reddish cupreous at the sides, similar to *sexsignata*. The color on the front of the head in the females varies from uniformly violaceous blue to purple, with the margins more or less greenish, and frequently there is a vague longitudinal carina on the occiput and vertex. The sides of the pronotum are usually sinuate and more or less parallel at the middle, but occasionally specimens are found with pronotum widest near the apical angles. Three specimens from Iowa have the dorsal surface of the body brownish purple, with a faint greenish tinge, and the foveae on the elytra coppery yellow. Specimens from Georgia are violaceous blue with the foveae on the elytra of the same color as the rest of the surface, whereas the specimens from the northern part of the country are purple with distinct greenish or bluish foveae. The length is from 5.5 to 9 mm.

Dejean (1833) simply listed *Chrysobothris azurea* from North America without giving any description. Castelnau and Gory (1836) misidentified a species from the same region as *ultramarina* Say and gave a short description. Mannerheim (1837) placed *azurea* Dejean as a synonym under *ultramarina* Castelnau and Gory (not Say). LeConte (1857), recognizing the erroneous identification of *ultramarina* by Castelnau and Gory, proposed *azurea*, the name given the species in the Dejean Catalogue, for *ultramarina* Castelnau and

Gory (not Say). The proposal of the new name *lecontei* by Leng (1920) for *azurea* Lec. (1859), which he considered preoccupied by *azurea* Lec. (1857), seems to be the unnecessary result of reliance upon the erroneous synonymy by Horn (1886), which is as follows:

> Dr. LeConte recognizing the erroneous identification [of *ultramarina* Castelnau and Gory] proposed the name *azurea* for it (Proc. Acad. 1857, p. 8) and in his Revision of the Buprestidae (Trans. Am. Philos. Soc. XI, 1859, p. 238) the name *concinnula* Lec. is substituted, and *azurea* used for another species.

This statement is incorrect, as is also his placing of *ultramarina* Castelnau and Gory (not Say) as a synonym of *scitula* Gory.

(101) CHRYSOBOTHRIS SEXSIGNATA (Say)

(Fig. 96; fig. 125, *D*)

Buprestis quadrimaculata Melsheimer, 1806, Cat. of Insects of Pennsylvania, p. 45. (No description.)

Buprestis sexguttata Say, 1823, Acad. Nat. Sci. Phila. Jour. 3: 161. (Name preoccupied.)

Buprestis sexsignata Say, 1836, Amer. Phil. Soc. Trans. (n. s.) 6: 158. (New name for *sexsignata* Say 1823, not Herbst 1801.)

Chrysobothris sexsignata Melsheimer, 1853, Cat. Coleopt. U. S., p. 64; LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 237–238; Horn, 1886, Amer. Ent. Soc. Trans. 13: 109, 112, pl. 7, figs. 212–216; Chittenden, 1889, Ent. Amer. 5: 219; Packard, 1890, U. S. Ent. Comn. Rpt. 5: 485, 520, fig. 174; Blatchley, 1910, Coleoptera of Indiana, pp. 789, 791, fig. 306; Knull, 1920, Ent. News 31: 6; 1922, Canad. Ent. 54: 82; 1925, Ohio State Univ. Studies 2 (2): 28, 33–34; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 171–172; Leonard, 1928, N. Y. (Cornell) Agr. Expt. Sta. Mem. 101: 359–360; Barrett, 1932, Calif. Univ. Pubs., Ent. 5 (15): 286; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 651–652; Brimley, 1938, Insects of North Carolina, p. 172; Procter, 1938, Biol. Survey Mt. Desert Island (Insect Fauna), p. 123.

Chrysobothris ignipes Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, pp. 50–51, pl. 9, fig. 68; LeConte, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 332.

Chrysobothris germari Castelnau and Gory, 1837, Monog. Buprestides, v. 2, *Chrysobothris*, p. 50, pl. 9, fig. 67; LeConte, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 332.

The list of citations to the literature is not complete, only the more important ones being listed.

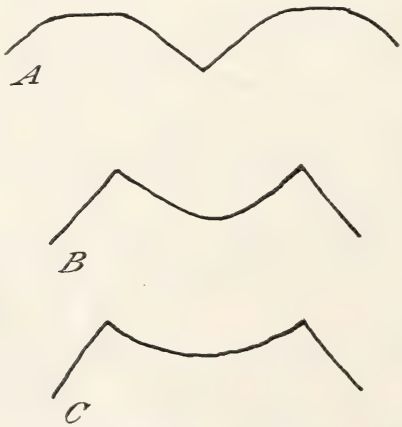

FIGURE 96.—Clypeus (*A*), and last visible abdominal sternite of male (*B*) and of female (*C*) of *Chrysobothris sexsignata*.

Female.—Broadly elongate, slightly convex above, rather strongly shining, piceous with distinct bronzy-green and purplish tinges, each elytron ornamented with three depressed cupreous foveae; beneath bluish green, with sides, and legs in part, brownish cupreous.

Head purplish brown, the lateral margins, and anterior margin of clypeus, greenish, with a vague longitudinal carina on occiput, a very small, indistinct chevron on vertex, and a broad, transverse elevation below chevron; front flat; surface coarsely, rather densely, irregularly punctate; sparsely clothed with rather long, semierect, inconspicuous hairs; clypeus deeply, angularly emarginate in front, subtruncate on each side. Antenna purplish brown, with a more or less distinct bronzy-green tinge, slightly narrowed to apex; intermediate segments compact, as wide as long, broadly rounded at outer margins; third segments slightly longer than following three segments united.

Pronotum nearly twice as wide as long, slightly narrower at apex than at base, widest near apex; sides slightly, obliquely converging from near apical angles to posterior angles; anterior margin broadly, arcuately emarginate, with an obscure, broadly rounded, median lobe; base broadly, angularly emarginate on each side, median lobe strongly produced, subtruncate in front of scutellum; disk slightly convex, with a vague, broad, median depression posteriorly, and a transverse depression on each side behind anterior margin; surface coarsely, transversely rugose, densely granulose, sparsely, coarsely punctate between rugae, clothed with a few very short, inconspicuous hairs at sides. Scutellum green.

Elytra distinctly wider than pronotum, nearly twice as long as wide, widest behind middle; sides feebly diverging from humeral angles to behind middles, then arcuately converging to tips, which are separately narrowly rounded; lateral margins distinctly serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, coarsely, rather densely, irregularly punctate, intervals smooth. Each elytron with four smooth, longitudinal costae; first distinct, sinuate near apex, extending from base to apex; second and third slightly elevated, broadly interrupted; fourth distinct, following outline of lateral margin; and with three depressed cupreous foveae, one in basal depression, one on second costa in front of middle, and the other on third costa at apical third.

Abdomen beneath finely, sparsely punctate at middle, more densely punctate at sides, rather densely clothed at sides with moderately long, recumbent hairs, without distinct lateral callosities; last visible sternite shallowly, arcuately emarginate at apex, longitudinally carinate at middle, without a submarginal ridge, lateral margins not serrate; eighth tergite densely, coarsely punctate, broadly rounded at apex. Prosternum coarsely, rather densely punctate, transversely rugose anteriorly, sparsely clothed with long, semierect, whitish hairs; anterior margin truncate, with a short, broad, median lobe. Anterior femur with a large, obtusely angulated tooth, which is dentate on outer margin. Anterior and middle tibiae arcuate, unarmed at apices; posterior tibia straight.

Length 10 mm., width 4 mm.

Redescribed from a female in the United States National Museum, collected at Frankford, Pa., June 18, by A. Schmidt.

Male.—Differing from the female in having the front of the head bright green, becoming brownish cupreous on vertex and occiput, the antenna bright green to bronzy green, the last visible abdominal sternite shorter and broadly, deeply, arcuately emarginate at apex, and the prosternum more densely punctured, especially at middle.

Type locality.—Of *quadrimaculata*, Pennsylvania; present location of type unknown. Of *sexsignata*, Missouri and Atlantic States; type probably lost. Of *ignipes*, Boston, Mass.; type in the British Museum. Of *germari*, North America; type supposed to be in the collection of René Oberthür, but has not been examined by the writer.

Distribution.—Specimens have been examined from Ontario, the District of Columbia, and various localities in the following States: Connecticut, Florida, Illinois, Iowa, Kansas, Maine, Maryland, Mas-

sachusetts, Michigan, Missouri, Nebraska, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, South Carolina, Virginia, and West Virginia.

The species has also been recorded in the literature from Quebec, Canada, and from Arizona, Colorado, Georgia, Indiana, Ohio, and Rhode Island, but there is some doubt about the record from Arizona.

Hosts.—This species is recorded in the literature as breeding in southern cypress (*Taxodium distichum* (Linnaeus) Richard), pitch pine (*Pinus rigida* Miller), tamarack (*Larix laricina* (DuRoi) Koch), hickory (*Hicoria* sp.), butternut (*Juglans cinerea* Linnaeus), black walnut (*Juglans nigra* Linnaeus), chestnut (*Castanea dentata* (Marshall) Borkhausen), hemlock (*Tsuga canadensis* (Linnaeus) Carrière), beech (*Fagus* sp.), yellow birch (*Betula lutea* Michaux), red maple (*Acer rubrum* Linnaeus), black ash (*Fraxinus nigra* Marshall), white ash (*Fraxinus americana* Linnaeus), white oak (*Quercus alba* Linnaeus), post oak (*Quercus stellata* Wangenheim), and swamp white oak (*Quercus bicolor* Willdenow).

The color of the foveae on the elytra varies from golden green to purplish cupreous, and sometimes is nearly the same color as the rest of the surface. Usually the abdomen is bright green at the middle, but rarely the entire surface is more or less brownish cupreous. The apex of the last visible abdominal sternite in the female is usually triangularly emarginate, but in a few of the specimens examined it was more or less truncate. In nearly all the specimens the sides of the pronotum converge from near the apical angles to the posterior angles, but occasionally a specimen is found with the sides sinuate and parallel at the middle. The prosternum is usually truncate in front, but occasionally there are indications of a median lobe. The length is from 6.5 to 12.5 mm.

Say (1823) writes that "we found this species during our expedition to the Missouri, and it is also an inhabitant of the Atlantic States." Specimens examined from the Missouri region do not agree with the description given by Say as well as the specimen from which the above redescription is made, and since the type of *sexisignata* is supposed to be lost, I am designating that specimen as the neotype.

LeConte (1873), after examining the types of Castlenau and Gory in the Count Mniszech collection in Paris, writes that *ignipes* is a synonym of *sexsignata*, and that *germari* seems to be a variety of *solieri*, which does not occur in the United States, but all the later writers consider *germari* as a synonym of *sexsignata*.

(102) CHRYSOBOTHRIS CONCINNULA LeConte

(Fig. 96; fig. 125, *E*)

Chrysobothris concinnula LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 238–239; Bland, 1864, Ent. Soc. Phila. Proc. 3: 197; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1424; Saunders, 1871, Cat. Buprestidarium, p. 96.

Chrysobothris scitula Hubbard and Schwarz 1878 (not Gory; misidentification), Amer. Phil. Soc. Proc. 17: 656; Horn, 1886, Amer. Ent. Soc. Trans. 13: 109, 115–116; Horn, 1886, Amer. Ent. Soc. Trans. 13: 109, 115–116.

pl. 7, figs. 232–236 (part); Ulke, 1902, U. S. Natl. Mus. Proc. 25: 21, 47; Felt, 1906, N. Y. State Mus. Mem. 8: 701; Smith, 1910, N. J. State Mus. Rpt. (1909): 293; Blatchley, 1910, Coleoptera of Indiana, pp. 789, 792; Knull, 1922, Canad. Ent. 54: 83; 1925, Ohio State Univ. Studies 2 (2): 28, 34–35; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 169–170 (part); Leonard, 1928, N. Y. (Cornell) Agr. Expt. Sta. Mem. 101: 360; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 649–659 (part); Brimley, 1938, Insects of North Carolina, p. 172.

Chrysobothris chlorocephala Packard (not Gory), 1890, U. S. Ent. Comn. Rpt. 5: 69; Hamilton, 1891, Insect Life 4: 130.

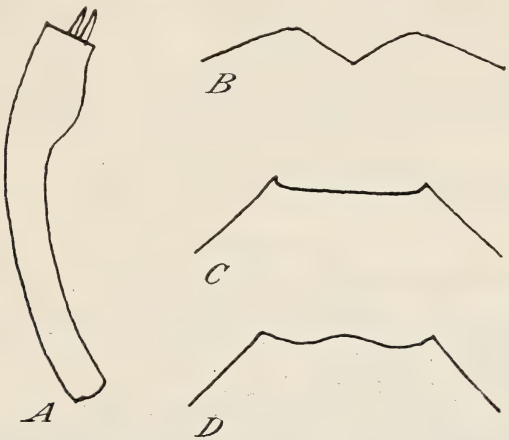

FIGURE 97.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris concinnula*.

Male.—Rather narrowly elongate, slightly convex above, strongly shining; violaceous brown, with distinct bluish and bronzy-green tinges in different lights, pronotum slightly greenish at sides and elytra ornamented with violaceous-blue spots; beneath bluish or purplish black, with sternum, and legs in part, more or less bronzy green.

Head bright green, with an obscure, smooth, longitudinal carina on occiput, carina vaguely bifurcate on vertex, where the surface is slightly depressed; front slightly convex; surface very coarsely, deeply, irregularly, confluently punctate, and indistinctly pubescent; clypeus deeply, narrowly, angularly emarginate in front, obliquely truncate on each side. Antenna cupreous, with basal segments greenish, slightly narrowed to apex; intermediate segments compact, subtriangular, as wide as long, broadly rounded at outer margins; third segment nearly as long as following three segments united.

Pronotum one-half wider than long, wider at base than at apex, widest near apex; sides strongly rounded near apices, obliquely converging and slightly sinuate from near apical angles to posterior angles; anterior margin slightly sinuate, with median lobe indistinctly rounded; base broadly, arcuately emarginate on each side, median lobe slightly produced, and narrowly subtruncate in front of scutellum; disk slightly convex, without depressions or callosities; surface sparsely, irregularly punctate at middle, more coarsely, deeply at sides, feebly, transversely rugose, intervals densely granulose.

Elytra at base distinctly wider than pronotum at base, nearly twice as long as wide, widest behind middle; sides rather strongly diverging from humeral angles to behind middle, then arcuately converging to tips, which are conjointly broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions vaguely indicated; surface glabrous, without longitudinal costae, coarsely, deeply, but not very densely punctate, obscurely rugose basally, intervals densely granulose, each elytron ornamented with violaceous blue as follows: A round spot in basal depression, a large, round, slightly depressed spot in front of middle, and an irregular, transverse fascia at apical third.

Abdomen beneath coarsely, sparsely, shallowly, irregularly punctate, indistinctly pubescent, without lateral callosities, intervals densely granulose; last visible sternite broadly truncate at apex, with angles slightly produced, with an indistinct submarginal ridge, lateral margins not serrate; eighth tergite coarsely, densely punctate, broadly rounded at apex. Prosternum coarsely, confluently punctate, nearly glabrous; anterior margin with a distinct, long, median lobe. Anterior femur with a large, acutely triangular tooth, which is finely dentate on outer margin. Anterior and middle tibiae arcuate, the former with a rather long, narrow dilation at apex, the latter slightly dilated near apex; posterior tibia straight.

Length 7 mm., width 2.5 mm.

Redescribed from the male type, No. 2708, in the Museum of Comparative Zoology, Cambridge, Mass.

Female.—Differing from the male in having the front of the head uniformly violaceous, the last visible sternite more elongate, and sinuately truncate at apex, the legs uniformly violaceous, and the anterior and middle tibiae unarmed at their apices.

Type locality.—Missouri, no definite locality, the type simply labeled with a lemon-yellow disk.

DISTRIBUTION

From material examined:

DISTRICT OF COLUMBIA: Washington, June 23, 1907 (F. H. Chittenden).
ILLINOIS: Ziegler, August 5, 1933 (J. Karlovic).
KANSAS: No definite locality.
MISSOURI: No definite locality, type.
NEW JERSEY: Riverton, July 1, 1925 (R. J. and M. S. Sim).
PENNSYLVANIA: Philadelphia (H. Soltau). Philadelphia Neck, July 4 (H. A. Wenzel). Frankford, June 28 (A. Schmidt). Angora, June 25 (G. M. Greene). Glenolden, June 13 (H. A. Kaeber). Franklinville.
VIRGINIA: Ft. Monroe, July 16 (Hubbard and Schwarz). Cape Henry, June 25, 1932 (H. G. Barber).

It has also been recorded in the literature from Connecticut, Indiana, Michigan, North Carolina, New York, and Ohio, but some of these records may refer to *azurea*.

Host.—It is recorded in the literature as probably breeding in oak, and Chamberlin (1926) gives the host as pin oak (*Quercus minor* (Marshall) Sargent), which is considered a synonym of post oak (*Quercus stellata* Wangenheim).

The color on the dorsal surface of the body is rather uniform in this species, but the pronotum is slightly more greenish and the elytra more brownish in some examples, and the color of the spots on the elytra varies from violaceous blue to greenish blue. The clypeus is either arcuately or angularly emarginate in front. The length is from 5.5 to 7 mm.

This species is identified in our collections as *scitula*, but it differs from that species in having the dorsal surface of the body violaceous brown, the elytra with violaceous or greenish-blue spots, of which the median one on each elytron is feebly impressed, and the pronotum more finely, irregularly punctate at the middle and more strongly rugose. The male genitalia and dilation on anterior tibia are similar in the two species. *Chrysobothris concinnula* may be simply a color variety of *scitula*, but the specimens of *concinnula* examined are rather uniform in color and should be separated from *scitula*, at least until more material of the latter species is available for study. LeConte described *concinnula* from a single specimen, which he identified as a female, but the type is a male.

(103) Crysobothris scitula Gory

(Fig. 98)

Chrysobothris scitula Dejean, 1833, Cat. Coléopt., ed. 2, p. 80, 1836, ed. 3, p. 90 (no description); Gory, 1840, Monog. Buprestides, sup. 4, p. 160, pl. 27, fig. 155; LeConte, 1857, Acad. Nat. Sci. Phila. Proc. [9]: 9; LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 239, 240; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1426; Saunders, 1871, Cat. Buprestidarum, p. 96.

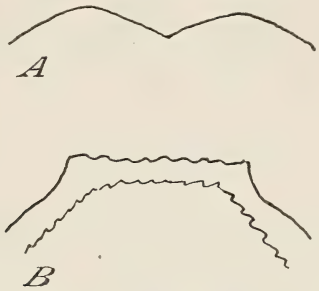

Figure 98.—Clypeus (*A*) and last visible abdominal sternite of male (*B*) of *Chrysobothris scitula.*

Male.—Rather narrowly elongate, slightly convex above, strongly shining; surface above bluish green, each elytron with three purplish-brown spots; beneath bluish black, with a faint violaceous reflection, the legs more or less bronzy green.

Head green, with a faint yellowish tinge, and a vague longitudinal carina on occiput; front nearly flat; surface coarsely, deeply, irregularly punctate, indistinctly pubescent; clypeus rather deeply, broadly, subangularly emarginate in front, nearly truncate on each side. Antenna cupreous, with basal segments yellowish green, slightly narrowed to apex; intermediate segments not compact, subtriangular, as wide as long, broadly rounded at outer margins; third segment as long as following three segments united.

Pronotum three-fourths wider than long, wider at base than at apex, widest near apex; sides strongly rounded near apices, obliquely converging from near apical angles to posterior angles; anterior margin strongly sinuate, with median lobe broadly rounded; base broadly, arcuately emarginate on each side, median lobe slightly produced, broadly rounded in front of scutellum; disk slightly convex, without depressions or callosities; surface coarsely, deeply, uniformly punctate over entire surface, vaguely, transversely rugose, the intervals finely, densely granulose.

Elytra at base distinctly wider than pronotum at base, nearly twice as long as wide, widest behind middle; sides diverging from humeral angles to behind middle, then arcuately converging to tips, which are conjointly broadly rounded; lateral margins coarsely serrate; basal depressions broad and moderately deep; humeral depressions barely indicated; surface glabrous, without discal foveae or longitudinal costae, coarsely, deeply, densely punctate, slightly rugose basally, intervals densely granulose, each elytron ornamented with purple-brown spots as follows: A large round spot at basal fourth, a large triangular spot at middle, and a smaller triangular spot at apical fourth.

Abdomen beneath coarsely, sparsely, shallowly, irregularly punctate, indistinctly pubescent, without lateral callosities, intervals densely granulose; last visible sternite transversely sinuate at apex, with a slightly elevated submarginal ridge, lateral margins slightly sinuate but not serrate; eighth tergite coarsely, densely punctate, densely granulose, broadly rounded at apex. Prosternum coarsely, densely punctate, nearly glabrous; anterior margin with a distinct, long, median lobe. Anterior femur with a large, acutely triangular tooth, which is obscurely dentate on outer margin. Anterior and middle tibiae arcuate, the former with a rather long, narrow dilation at apex, the latter dilated at apex; posterior tibia straight. Genitalia similar to those of *concinnula.*

Length 6 mm., width 2.5 mm.

Redescribed from a male in the United States National Museum, collected at Clemson College, S. C., during the summer of 1926, by W. C. Maxwell.

Female.—None seen.

Type locality.—North America, probably Georgia; present location of type unknown to the writer.

Gory described this species from a specimen in the Dejean Collection. The elder LeConte sent a large number of Coleoptera collected in Georgia to Dejean, and the specimen from which the above redescription was made is from near the supposed type locality. This is the only specimen seen that agrees with the description given by Gory.

(104) CHRYSOBOTHRIS SEXFASCIATA Schaeffer

(Fig. 125, *F*)

Chrysobothris sexfasciata Schaeffer, 1919, N. Y. Ent. Soc. Jour. (1918) 26: 212–213; Fisher, 1925, U. S. Natl. Mus. Proc. 65 (9): 127–128; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 170; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 650.

Female.—Small, oblong, equally rounded in front and behind, moderately convex, subopaque, uniformly purplish red, each elytron ornamented with bright green as follows: A broad basal fascia extending from near scutellum to lateral margin, where it is connected to a broad, slightly arcuate, antemedian fascia, which does not reach the sutural margin; a broad, transverse spot at apical third, and a small spot at apex; beneath dark brown, with purplish, reddish, and bronzy reflections in certain lights, and more strongly shining than above.

Head uniformly purplish brown, with a short, smooth, longitudinal carina on occiput; front slightly convex; surface finely, densely granulose, coarsely, densely, shallowly punctate, sparsely clothed with short, recumbent, whitish hairs; eyes narrowly separated on occiput; clypeus broadly, deeply, triangularly emarginate in front, obliquely truncate on each side. Antenna uniformly reddish brown, slightly narrowed to apex; intermediate segments rather compact, subtriangular, as long as wide, broadly rounded at outer margins; third segment as long as following two segments united.

Pronotum twice as wide as long, narrower at apex than at base, widest at middle; sides arcuately rounded; posterior angles broadly rounded; anterior margin slightly, broadly, arcuately emarginate, without a median lobe; base arcuately emarginate on each side, median lobe strongly produced, truncate in front of scutellum; disk moderately convex, without depressions or callosities; surface coarsely, densely, uniformly punctate, slightly rugose toward posterior angles, intervals finely, densely granulose.

Elytra distinctly wider than pronotum at base, widest behind middle, not quite twice as long as wide; sides slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded; lateral margins coarsely serrate posteriorly; basal depressions broad and deep; humeral depressions rather small and shallow; surface glabrous, densely, coarsely, uniformly punctate, intervals finely, densely granulose, each elytron with a moderately deep, transverse depression in the bright-green, antemedian fascia, but without longitudinal costae.

Abdomen beneath coarsely, sparsely punctate, sparsely clothed with short, erect, white hairs, without lateral callosities, intervals densely, finely granulose; last visible sternite broadly rounded at apex, without a submarginal ridge, lateral margins not serrate; eighth tergite finely, densely punctate, densely granulose, broadly rounded at apex. Prosternum sparsely, coarsely punctate, sparsely clothed with short, semierect, white hairs; anterior margin with a narrow median lobe. Anterior femur with a rather large, acutely triangular tooth, which is not distinctly dentate on outer margin. Anterior tibia slightly sinuate, unarmed at apex; middle and posterior tibiae straight.

Length 4.75 mm., width 2.25 mm.

Redescribed from the female holotype in the United States National Museum. (From the Brooklyn Museum Collection.)

Male.—Differing from the female in having the front of the head purple at middle, bright green on occiput, and bronzy green on clypeus and along lateral margins, the antenna bronzy cupreous, and the sides of the sternites bright green.

Type locality.—Key West, Fla.

DISTRIBUTION

From material examined:

FLORIDA: Key West, type, April 4 (E. A. Schwarz).
CUBA: Cayamas, May 23 (E. A. Schwarz). Camaguey, July 20, 1932 (M. Jaume).

Host.—Unknown.

The specimens examined show very little variation, except in size, ranging in length from 4.25 to 5.5 mm. In one of the specimens from Cuba the basal and antemedian fasciae on the elytra are not connected to each other along the lateral margins.

This species resembles small specimens of *chrysoela* Illiger, but it differs from that species in having the sides of the clypeus obliquely truncate, the eyes narrowly separated on the occiput, the pronotum arcuately rounded at the sides, the last visible abdominal sternite broadly rounded at the apex in both sexes, and a bright-green spot at the apex of each elytron.

(105) CHRYSOBOTHRIS CONVEXA Fall

(Fig. 99; fig. 126, *A*)

Chrysobothris convexa Fall, 1907, Amer. Ent. Soc. Trans. 33: 180, 233–234; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 144; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 616.

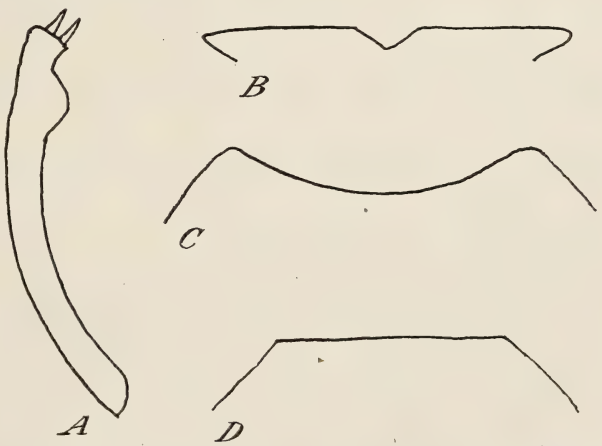

FIGURE 99.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris convexa.*

Female.—Elongate, strongly convex above, strongly shining, uniformly cupreous brown.

Head with a distinct, smooth chevron on vertex and a narrow, longitudinal carina on occiput; front slightly convex; surface coarsely, shallowly, irregularly punctate, more or less rugose, rather densely, irregularly clothed with long, recumbent, whitish hairs, intervals finely granulose; clypeus narrowly, angularly

emarginate in front, broadly, transversely truncate on each side. Antenna piceous, slightly bronzy on basal segments, not distinctly narrowed to apex; intermediate segments triangular, wider than long; third segment subequal in length to the following two segments united.

Pronotum three-fifths wider than long, slightly narrower at apex than at base, widest at apical fourth; sides strongly converging near apices, obliquely converging from apical fourth to posterior angles; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base broadly, arcuately emarginate on each side, median lobe broadly rounded, subtruncate in front of scutellum; disk rather strongly convex, uneven, with numerous irregular, smooth callosities (four rather distinct ones arranged transversely in front of middle), without a median depression, but with a smooth median line posteriorly, separating two rather broad, distinct, basal depressions, which are limited laterally by a short, smooth, longitudinal elevation; surface rather coarsely, irregularly punctate between smooth elevations, clothed with a few fine, moderately long, erect hairs, especially at sides. Scutellum small, triangular.

Elytra at base slightly wider than pronotum at middle, nearly twice as long as wide; sides nearly parallel (slightly concave behind humeral angles) to apical third, then arcuately converging to tips, which are separately, rather broadly rounded; lateral margins coarsely serrate; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, finely, densely, irregularly punctate between costae. Each elytron with four narrow, smooth, longitudinal costae; first entire, nearly parallel with sutural margin, extending from base to apex; second extending from apex to basal fovea, slightly interrupted at middle and apical two-fifths by vaguely defined depressions; third short; fourth not so distinct, following outline of lateral margin.

Abdomen beneath coarsely, densely fossulate-punctate, obscurely, transversely rugose, densely clothed with long, recumbent, whitish hairs, which are denser at sides, with small, round, slightly elevated, smooth, lateral callosities, intervals finely, densely granulose; last visible sternite broadly subtruncate at apex, without a distinct submarginal ridge, lateral margins not distinctly serrate; eighth tergite coarsely, confluently punctate, broadly rounded at apex. Prosternum coarsely punctate, transversely rugose, sparsely clothed with long, semierect, whitish hairs; anterior margin truncate, without a median lobe. Anterior femur with a long, acutely triangular tooth, which is coarsely dentate on outer margin. Anterior tibia rather strongly arcuate, unarmed at apex; middle and posterior tibiae straight.

Length 11 mm., width 4.4 mm.

Redescribed from the female type in the Academy of Natural Sciences of Philadelphia.

Male.—Differing from the female in having the last visible abdominal sternite broadly, shallowly emarginate at apex, and the anterior tibia armed with a rounded dilation near apex.

Type locality.—Alamogordo, N. Mex.

Host.—Unknown.

Fall described this species from a single female collected by H. L. Viereck. The only other specimen examined by the writer is a male collected June 14, 1935, in Brewster County, Tex., by J. N. Knull. This specimen was compared with the type, from which it differs slightly in having the clypeus a little more broadly emarginate in front, and the lateral margins of the last visible abdominal sternite slightly serrate. This species is retained with the species having the lateral margins of the last visible abdominal sternite entire, but should additional material show that these margins are serrate, the species can be easily separated from the other species having serrate margins by the shape of the clypeus.

(106) Chrysobothris biramosa (Fisher)

(Fig. 100)

Knowltonia biramosa Fisher, 1935, Ent. Soc. Wash. Proc. 37: 117–118. (New synonymy.)

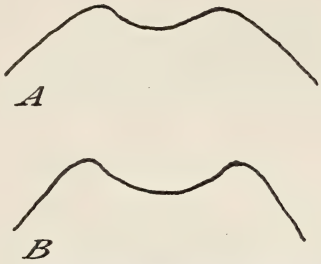

Figure 100.—Clypeus (*A*) and last visible abdominal sternite of male (*B*) of *Chrysobothris biramosa.*

Male.—Broadly elongate, moderately convex above, slightly shining, brownish cupreous, with a more or less greenish tinge, elytra ornamented with irregular, violaceous-black spots; beneath brownish cupreous, with distinct greenish and bronzy reflections.

Head uniformly brownish cupreous; front slightly convex; surface densely, coarsely, shallowly, irregularly punctate, finely, densely granulose, sparsely clothed anteriorly with short, erect, inconspicuous hairs; clypeus broadly, arcuately emarginate in front, arcuately rounded on each side. Antenna biramose, extending to basal third of pronotum, densely granulose; basal segments coarsely punctate; rami densely clothed with short, erect hairs, the outer ramus on each segment slightly shorter than the inner one.

Pronotum twice as wide as long, subequal in width at base and apex, widest just behind middle; sides arcuately rounded, more obliquely anteriorly; posterior angles broadly rounded; anterior margin slightly sinuate, with an indistinct, broadly rounded, median lobe; base transversely subtruncate on each side, median lobe strongly produced and broadly rounded; disk uniformly convex, without depressions or callosities; surface glabrous, densely, finely granulose, rather densely, coarsely, irregularly punctate, and transversely rugose along base.

Elytra at base as wide as pronotum near middle, one and one-third times as long as wide, widest at apical third; sides slightly diverging from humeral angles to apical third, then arcuately converging to tips, which are conjointly broadly rounded, but not extending to tip of abdomen; lateral margins slightly serrate posteriorly; basal depressions round and deep; humeral depressions indistinct; surface glabrous, densely, finely granulose, coarsely, densely punctate, more or less rugose, each elytron ornamented with violaceous-black markings as follows: A large, irregular, elongate spot covering median part, but interrupted at middle and apical third by brownish-cupreous spots.

Abdomen beneath coarsely, rather densely, irregularly punctate, smooth along anterior and posterior margins of sternites, sparsely clothed with short, inconspicuous hairs, without lateral callosities, intervals finely granulose; last visible sternite broadly, arcuately emarginate at apex, without a submarginal ridge, lateral margins not serrate; eighth tergite coarsely, confluently punctate, broadly rounded at apex. Prosternum coarsely, sparsely, irregularly punctate, sparsely clothed with short, inconspicuous hairs; anterior margin truncate, without a median lobe. Anterior femur with a long, acute tooth, which is not distinctly dentate on outer margin. Anterior and middle tibiae slightly arcuate, unarmed at apices; posterior tibia straight. Genitalia similar to those of *alleni.*

Length 10 mm., width 4 mm.

Female.—Unknown.

Redescribed from the male type in the United States National Museum.

Type locality.—Skull Valley, Utah.

The genus *Knowltonia* was erected for this species by the writer because of the bipectinate antenna of the male, the drawing of the male antenna of *atrifasciata* figured by Horn (1886) having been overlooked. Since that time more material of *Chrysobothris* has been available for study and this peculiar character of the males has been found in *atrifasciata*, *biramosa*, and *alleni*, so the genus *Knowltonia* must be placed as a synonym of *Chrysobothris*.

This species was described from a single male collected July 6, 1934, by C. F. Smith, and so far is the only specimen seen. Nothing is known of its larval habits.

(107) Chrysobothris ulkei LeConte

(Fig. 101)

Chrysobothris ulkei LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 240; Gemminger and Harold, 1869, Cat. Coleopt., v. 5, p. 1428; Horn, 1886, Amer. Ent. Soc. Trans. 13: 116, 117, pl. 7, fig. 243; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 222; Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 368; Chamberlin, 1926, Cat. Buprestidae North Amer., pp. 175–176; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 656.

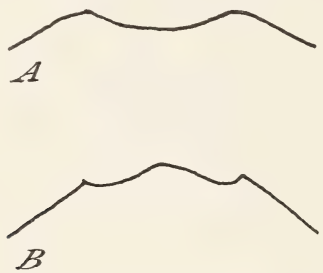

Figure 101.—Clypeus (*A*) and last visible abdominal sternite of female (*B*) of *Chrysobothris ulkei*.

Female.—Broadly elongate, moderately convex above, subopaque, bronzy green, with a faint bluish tinge, elytra ornamented with violaceous spots; beneath bronzy green, more strongly shining than above.

Head uniformly bronzy green, with a narrow, longitudinal carina on occiput; front slightly convex; surface coarsely, shallowly, rather densely punctate, clothed with a few short, inconspicuous hairs, intervals densely granulose; clypeus broadly, shallowly, arcuately emarginate in front, obliquely subtruncate on each side. Antenna purplish brown, slightly bronzy at base, slightly narrowed to apex; intermediate segments not strongly compact, slightly wider than long, broadly subtruncate at outer margins; third segment slightly longer than following three segments united.

Pronotum twice as wide as long, distinctly narrower at apex than at base, widest at basal third; sides obliquely converging from basal third to posterior and anterior angles; posterior angles very broadly rounded; anterior margin slightly sinuate, with an obsolete, broadly rounded, median lobe; base transversely truncate on each side, median lobe strongly produced and broadly rounded; disk moderately, uniformly convex, without depressions or callosities; surface glabrous, coarsely, irregularly punctate, sparsely on median part, more densely toward sides, with an elongate, smooth, median area in front of scutellum.

Elytra scarcely wider than pronotum, about one and one-half times as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded, but not extending to tip of abdomen; lateral margins coarsely serrate posteriorly; basal depressions transverse and very deep; humeral depressions rather broad and shallow; surface glabrous, coarsely, confluently punctate, more or less rugose, intervals densely

granulose, each elytron ornamented with violaceous spots as follows: A small, round spot at basal third, a transversely triangular spot behind middle, and an irregular, oblique spot near apex.

Abdomen beneath sparsely, coarsely, shallowly punctate, the punctures open posteriorly, clothed with a few short, inconspicuous hairs, without lateral callosities, intervals densely granulose; last visible sternite thickened and transversely sinuate at apex, with margins strongly deflexed, without a submarginal ridge, lateral margins not serrate; eighth tergite coarsely, deeply, confluently punctate, densely granulose, broadly rounded at apex. Prosternum coarsely, confluently punctate, transversely rugose and declivous anteriorly, clothed with a few short, inconspicuous hairs; anterior margin transversely sinuate, deflexed, without a median lobe. Anterior femur with a broad, short, obtusely angulated tooth, which is vaguely dentate on outer margin. Anterior tibia moderately arcuate, unarmed at apex; middle tibia slightly arcuate; posterior tibia straight.

Length 14 mm., width 6 mm.

Male.—Unknown.

Redescribed from a female in the United States National Museum, collected on agave during August at Fort Bliss, Tex., by B. Shimek.

Type locality.—Texas. Described from a single female in the Ulke collection, but the present location of the type is unknown to the writer.

DISTRIBUTION

From material examined:

Texas: Fort Bliss, August (B. Shimek). Marathon, Brewster County, August 26–27, 1912, 3,940 to 4,160 feet elevation (Rehn and Hebard).

Chamberlin (1926) records the species from Amedee, Calif., in July, at an elevation of 4,200 feet.

Host.—The larval habits are unknown, but Mr. Shimek collected an adult on agave at Fort Bliss, Tex.

Only two females have been examined by the writer and no variation has been observed except in size and in the violaceous markings on the elytra. In the specimen from Marathon the three triangular spots on each elytron are narrowly joined to one another near the sutural margin, whereas in the specimen from Fort Bliss the spots are widely separated and the anterior one is only vaguely indicated. The length is from 14 to 17 mm.

LeConte described this species from a single female in the Ulka collection. Horn (1886) figured the pronotum of the type loaned to him by Mr. Ulke. The type is recorded as being in the Ulke collection in Pittsburgh, but Mr. Buchanan examined the specimens in that collection for the writer, and was unable to locate the type. It is just possible that Mr. Ulke loaned this specimen to some person before the collection was sent to Pittsburgh.

(108) Chrysobothris atrifasciata LeConte

(Fig. 102; fig. 126, *B*)

Chrysobothris nigrofasciata LeConte, 1859, Amer. Phil. Soc. Trans. (n. s.) 11: 240 (misidentified, not *nigrofasciata* Castelnau and Gory).

Chrysobothris atrifasciata LeConte, 1873, Acad. Nat. Sci. Phila. Proc. [25]: 332 (new name for *nigrofasciata* LeConte 1859, not Castelnau and Gory 1837); Horn, 1886, Amer. Ent. Soc. Trans. 13: 116–117, pl. 7, figs. 237–242; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 207; Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 368; Wickham, 1898, Iowa Univ. Lab. Nat. Hist. Bul. 4: 305; 1898, Ent. News 9: 235–236; 1902, Iowa Univ Lab. Nat. Hist. Bul. 5: 268; Nicolay, 1921, N. Y. Ent. Soc. Jour. 29: 175; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 138; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, pp. 610–611.

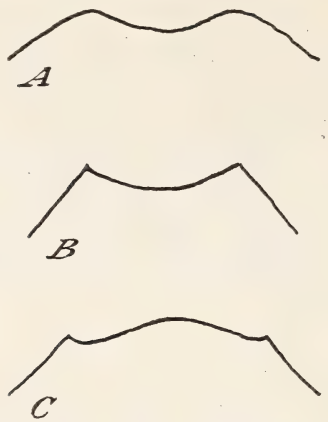

FIGURE 102.—Clypeus (*A*), and last visible abdominal sternite of male (*B*) and of female (*C*) of *Chrysobothris atrifasciata*

Female.—Broadly elongate, moderately convex above, subopaque, uniformly bronzy green, with a slight golden tinge, elytra ornamented with purplish-black spots; beneath bronzy green.

Head bronzy green in front, becoming cupreous on vertex and occiput, indistinctly, longitudinally carinate on occiput, with a vague, transversely arcuate line on vertex; surface coarsely, confluently ocellate-punctate on front, densely punctate on vertex and occiput, sparsely clothed with short, inconspicuous hairs; clypeus very broadly, shallowly, arcuately emarginate in front, broadly rounded on each side. Antenna brownish cupreous, slightly narrowed to apex; intermediate segments not compact, subtriangular, about as long as wide, acutely rounded at outer margins; third segment nearly as long as following three segments united.

Pronotum twice as wide as long, distinctly narrower at apex than at base, widest near middle; sides arcuately rounded; posterior angles obtusely rounded; anterior margin slightly sinuate, with a vague, broadly rounded, median lobe; base transversely sinuate on each side, median lobe strongly produced and broadly rounded; disk moderately convex, without depressions or callosities; surface glabrous, coarsely, densely, irregularly punctate, intervals finely granulose.

Elytra subequal in width to pronotum, one and two-thirds times as long as wide; sides parallel from humeral angles to apical third, then arcuately converging to tips, which are separately very broadly rounded, but not extending to tip of abdomen; lateral margins finely serrate; basal depressions small and very deep; humeral depressions broad and very shallow; surface glabrous, without foveae or distinct costae, coarsely, confluently punctate, intervals finely granulose, each elytron ornamented with purplish-black spots as follows: A transversely triangular spot at basal fourth, a triangular spot which is emarginate externally just behind middle, and an obliquely oblong spot near apex.

Abdomen beneath rather coarsely, densely, irregularly punctate, indistinctly pubescent, without smooth lateral callosities, intervals vaguely granulose; last visible sternite broadly, sinuately subtruncate at apex, without a submarginal ridge, lateral margins not serrate; eighth tergite finely, densely punctate, finely granulose, broadly rounded at apex. Prosternum convex, coarsely, sparsely, irregularly punctate, nearly glabrous, without a distinct median lobe in front. Anterior femur with a short, rather acute, triangular tooth, which is not dentate on outer margin. Anterior tibia slightly arcuate, unarmed at apex; middle and posterior tibiae straight.

Length 15 mm., width 5.5 mm.

Redescribed from the female lectotype, No. 2709, in the Museum of Comparative Zoology, Cambridge, Mass.

Male.—Differing from the female in having the antenna bipectinate from the fourth segment, with the inner ramus of each segment slightly longer than the outer one, and the last segment bifurcate, the last visible sternite broadly, shallowly, arcuately emarginate at apex, the eighth tergite more densely punctured, and the middle tibia slightly arcuate.

Type locality.—New Mexico. Lectotype simply labelled with a dark-green disk. Chamberlin (1926) gives the type locality as Arizona, near Yuma, but this is incorrect, as LeConte states that the type is from New Mexico.

DISTRIBUTION

From material examined:

California: Experimental Farm, Imperial County, June 1912 (J. C. Bridwell). Amedee, July 21–28, 4,200 feet elevation (H. F. Wickham). Coachella Valley (F. S. Stickney). Holtville, June 28, 1936 (M. Cazier).
Colorado: La Junta, Bent County, 4,000 feet elevation, June 24–25, 1885 (F. C. Bowditch).
Nevada: Hawthorne, June (H. F. Wickham).
New Mexico: No definite locality, type series (Capt. J. Pope) (F. H. Snow).

Wickham (1898) records this species from Yuma, Ariz.

Host.—Nothing is known of the larval habits, but Mr. Stickney collected the adults at the roots of *Atriplex* sp. in the Coachella Valley, Calif. Wickham (1898) reports collecting a specimen on an unidentified thorny bush at Yuma, Ariz.

The color on the dorsal surface of the body varies from dark green to bronzy green, and the purplish-black spots on the elytra are usually separated, sometimes joined to one another along the sutural margin, and in a specimen from Nevada the purplish spot extends over the greater part of the apical region. The underside of the body is bronzy green in the specimens from the type locality, but is brownish cupreous in most of the specimens examined from California. The sculpture on the pronotum and elytra is variable, and is more or less transversely rugose on many of the specimens. The length is from 7 to 14 mm.

LeConte (1859) recorded a male and female as having been collected in May and June by Capt. J. Pope while exploring the Llano Estacado, N. Mex., which he misidentified as the species described by Castlenau and Gory from Mexico as *nigrofasciata.* LeConte (1873), after examining the type of *nigrofasciata* in the collection of Count Mniszech, found that it was not that species, so he renamed it *atrifasciata.*

(109) Chrysobothris socialis Waterhouse

(Fig. 103; fig. 126, *C*)

Chrysobothris socialis Waterhouse, 1887, Biol. Cent.-Amer., Coleopt., v. 3, pt. 1, p. 39, pl. 3, figs. 10, 10a; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 220; Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 369; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 172; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 652.

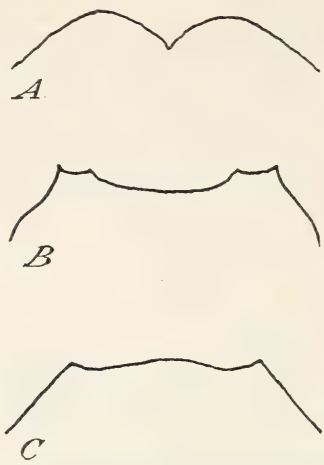

FIGURE 103.—Clypeus (*A*), and last visible abdominal sternite of male (*B*) and of female (*C*) of *Chrysobothris socialis*.

Male.—Broadly elongate, moderately convex above, subopaque, bronzy green, with a distinct bluish tinge, the elytra ornamented with blackish-violaceous spots; beneath varying from bronzy green to violaceous blue, and more strongly shining than above.

Head bronzy green, with a slight golden tinge, vaguely, longitudinally carinate on occiput, with an indistinct, transversely arcuate, elevated carina on vertex; front more or less uneven; surface coarsely, densely ocellate-punctate on front, more finely, deeply punctate on occiput, sparsely clothed with short, erect, inconspicuous hairs behind clypeus, intervals densely granulose; clypeus deeply, triangularly emarginate in front, with an acute, median notch, slightly rounded on each side. Antenna brownish cupreous, with a faint purplish tinge, slightly narrowed to apex; intermediate segments compact, as wide as long, broadly truncate at outer margins; third segment as long as the following three segments united.

Pronotum nearly twice as wide as long, slightly narrower at apex than at base, widest at middle; sides slightly, arcuately rounded; posterior angles obtuse; anterior margin sinuate, with a vague, broadly rounded, median lobe; base strongly, arcuately emarginate on each side, median lobe strongly produced and broadly rounded; disk moderately, uniformly convex, without depressions or callosities; surface glabrous, finely, densely, uniformly punctate, more confluently punctate at sides, intervals densely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide, widest behind middle; sides sinuate and slightly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately broadly rounded, but not extending to tip of abdomen; lateral margins coarsely serrate posteriorly; basal depressions broad and deep; humeral depressions broad and shallow; surface glabrous, without costae or foveae, finely, rather sparsely punctate on median parts, coarsely, confluently ocellate-punctate, and more or less rugose at base and sides, intervals densely, finely granulose, each elytron ornamented with blackish-violaceous spots as follows: A rounded, median spot at basal third; two similar spots at middle, one near lateral margin and a larger one near sutural margin; and an irregular, oblique spot near apex.

Abdomen beneath sparsely, shallowly punctate on median parts, more coarsely, densely toward sides and on apical sternite, punctures elongate and open posteriorly, clothed at sides with a few semierect, inconspicuous hairs, without distinct lateral callosities, intervals densely granulose, last visible sternite slightly, arcuately emarginate at apex, scarcely produced at external angles, without a distinct submarginal ridge, lateral margins not serrate; eighth tergite densely, coarsely punctate, densely granulose, broadly rounded at apex. Prosternum coarsely, sparsely punctate, transversely rugose anteriorly, clothed with a few short, inconspicuous hairs; anterior margin broadly, arcuately rounded, but without a median lobe. Anterior femur with a broadly rounded tooth, which is

finely dentate on the outer margin. Anterior tibia strongly arcuate, with an indistinct dilation at apex; middle tibia slightly arcuate; posterior tibia straight.

Length 13.5 mm., width 5.5 mm.

Redescribed from a male in the United States National Museum, simply labelled "Arizona." This specimen was compared with a specimen in the Horn collection, which had been compared with the type.

Female.—Differing from the male in having the basal segments of the antenna bronzy green, the last visible abdominal sternite broadly, transversely sinuate at apex, with a slightly elevated, transversely arcuate, preapical ridge, the anterior tibiae unarmed at apex, and the middle tibia straight.

Type locality.—Ventanas in Durango (2,000 feet elevation), Mexico. Type in the British Museum.

DISTRIBUTION

From material examined:

ARIZONA: Fort Grant and Fort Yuma.

Also recorded in the literature from Nogales, Ariz., by Chamberlin (1926) and from Ventanas in Durango, Mexico, by Waterhouse (1887).

Host.—Unknown.

No variation worthy of note has been observed in the few specimens examined. The length is from 12.5 to 14 mm.

This species resembles *atrifasciata* LeConte very closely, but in *socialis* the bluish tinge on the dorsal surface of the body is usually more distinct, the clypeus is deeply, angularly emarginate, with a distinct, acute, median notch, the antenna of the male is not bipectinate, and the last visible abdominal sternite of the female has the external angles of the apical emargination more strongly produced, and with a vague preapical ridge. Waterhouse described the species from a single specimen which, according to his drawing, is a male.

(110) CHRYSOBOTHRIS LUCANA Horn

(Fig. 104; fig. 126, *D*)

Chrysobothris lucana Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 328, 367–368; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 118; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 161; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 639.

Female.—Rather broadly elongate, moderately convex above, slightly shining, olivaceous green, sides of pronotum and elytra with a bluish tinge, and the latter ornamented with violaceous-black spots; beneath violaceous black, more or less greenish at middle, and more strongly shining than above.

Head green, slightly bluish behind clypeus, with a vague longitudinal carina on occiput, and an indistinct, transversely arcuate chevron on vertex, in front of which the surface is slightly depressed; front nearly flat; surface coarsely, rather densely punctate on vertex and occiput, shallowly, confluently ocellate-punctate behind clypeus, where the surface is clothed with a few short, semierect hairs, intervals densely, finely granulose; clypeus deeply, arcuately emarginate in front, with a narrow median incision, arcuately rounded on each side. Antenna bronzy brown, more greenish at base, gradually narrowed to apex; intermediate segments not very compact, slightly wider than long, broadly subtruncate at outer margins; third segment as long as following three segments united.

Pronotum two-thirds wider than long, slightly narrower at apex than at base; sides parallel and slightly sinuate at middle, arcuately converging at base and apex; anterior margin slightly emarginate, with a broad, slightly rounded,

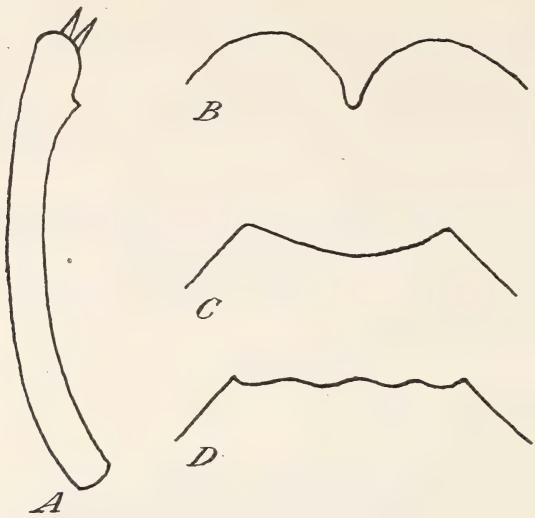

FIGURE 104.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris lucana.*

median lobe; base strongly, subangularly emarginate on each side, median lobe broadly rounded; disk uniformly convex, without depressions or callosities; surface glabrous, rather densely, coarsely, uniformly punctate, intervals densely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide; sides feebly diverging from humeral angles to behind middle, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate posteriorly; basal depressions broad and shallow; humeral depressions broad and inconspicuous; disk moderately convex, without costae or foveae; surface glabrous, rather densely, uniformly punctate, more finely toward apices, intervals finely granulose, and each elytron ornamented with violaceous-black spots not extending to sutural or lateral margins, as follows: An oblong one at basal third, a square one behind middle, and a similar spot near apex, united to the postmedian spot by a narrow, obsolete vitta.

Abdomen beneath coarsely, sparsely punctate, impunctate along anterior and posterior margins of sternites, clothed with a few short, semierect hairs, without lateral callosities, intervals obsoletely granulose; last visible sternite broadly, transversely sinuate at apex, with a distinct tooth at each external angle, without a distinct submarginal ridge, lateral margins not serrate; eighth tergite densely, coarsely punctate, broadly rounded at apex. Prosternum glabrous, coarsely, sparsely, irregularly punctate, with a rather long, wide, median lobe. Anterior femur with a short, obtusely rounded tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae feebly arcuate, unarmed at apices; posterior tibia straight.

Length 8 mm., width 3.25 mm.

Redescribed from a female in the United States National Museum from Catalina Springs, Ariz., which has been compared with the type by E. Gorton Linsley.

Male.—Differing from the female in having the head yellowish green, the antenna brownish cupreous, the last visible abdominal sternite broadly, shallowly, arcuately emarginate at apex, the anterior tibia armed with a short, inconspicuous tooth near apex, and the posterior tibia armed with a series of small teeth on inner margin.

Type locality.—San José del Cabo, Lower California; type in the California Academy of Sciences.

DISTRIBUTION

From material examined:

ARIZONA: Cactus Plain, October (F. H. Snow). Tucson, August 12–14, labeled "type *pimalas* Wickham Mss. name" (H. F. Wickham). Catalina Springs, May 5 (Hubbard and Schwarz). Sabino Canyon, April 26, 1919 (G. Hofer). Nogales, Santa Cruz County, October 2, 1906 (F. W. Nunenmacher). Palmerlee, Cochise County, August 10 (C. Schaeffer). Prescott (Mason collection).

CALIFORNIA: Kernville, May 14, 1930; Riverside County (E. G. Linsley). Hot Springs, Tulare County, July 5, 1925 (E. R. Leach). Mill Creek, 5,200 to 5,500 feet elevation, San Bernardino Mountains, August 28, 1919 (Rehn and Hebard).

LOWER CALIFORNIA: Santa Rosa and San Felipe (Gustav Beyer). San José del Cabo (Linsley collection). El Marmol, June 18, 1938 (Michelbacher and Ross). Sierra El Chinche, 2,000 feet elevation, cotype (Academy of Natural Sciences of Philadelphia).

Also recorded in the literature as follows:

ARIZONA: Huachuca Mountains, July (Chamberlin 1926).

CALIFORNIA: Pasadena, July 14; Monica (Fall 1901). Palm Springs and Tulare (Chamberlin 1926).

Hosts.—Chamberlin (1926) gives the host as coast live oak (*Quercus agrifolia* Née). Specimens in the United States National Museum collection are labeled as having been collected at Catalina Springs, Ariz., by Hubbard and Schwarz at the roots of senna (*Cassia covesii* Gray), and on the same plant at Sabino Canyon, Ariz., by George Hofer.

There is considerable variation in the coloration and violaceous markings on the elytra in this species. The color on the dorsal surface of the body varies from bronzy green to violaceous blue, and the markings on the elytra are usually separated, sometimes joined to one another along the sutural margins, and occasionally a specimen is found in which the violaceous-black spot covers the greater part of the apical region. In a few examples the pronotum is widest near the apex, with the sides converging posteriorly, and the surface is more or less rugose. A series of specimens from San Felipe and Santa Rosa from the Beyer Collection have the pronotum more or less rugose, bright green, and the elytra violaceous blue. The length is from 7 to 9.5 mm.

This species was described by Horn from females and he gives the type localities as Sierra El Chinche (2,000 feet) and San José del Cabo, Lower California. Chamberlin (1926) gives the type locality as Sierra El Chinche, but the type series in the California Academy of Sciences consists of two specimens, both labeled "San José del Cabo, Lower California," of which type No. 21 is the lectotype. A cotype, No. 3448, in the Academy of Natural Sciences of Philadelphia, labeled with a silver disk, is probably the specimen from Sierra El Chinche mentioned by Horn.

(111) CHRYSOBOTHRIS PLATTI Cazier

(Fig. 105)

Chrysobothris platti Cazier, 1938, South. Calif. Acad. Sci. Bul. 37: 14–15

Female.—Rather narrowly elongate, moderately convex above, subopaque, uniformly bronzy green, with a faint golden tinge; beneath bronzy green, with a distinct golden tinge, and strongly shining.

Head dark bronzy green, with a narrow longitudinal carina on occiput; front slightly convex; surface coarsely, deeply, irregularly punctate, punctures coarser and somewhat confluent behind clypeus, sparsely clothed with very short, incon-

spicuous hairs, intervals finely, densely granulose; clypeus broadly truncate in front. Antenna bronzy green basally, becoming blackish cupreous toward apex, slightly narrowed to apex; intermediate segments rather compact, slightly wider than long, broadly rounded at outer margins; third segment subequal in length to following two segments united.

Pronotum nearly twice as wide as long, narrower at apex than at base, widest at middle; sides strongly, uniformly rounded; anterior margin slightly sinuate, with a vague median lobe; base transversely subtruncate on each side, median lobe strongly produced, and broadly rounded; disk moderately convex, without depressions or callosities; surface glabrous, sparsely, shallowly, irregularly punctate at middle, more densely punctate toward sides, intervals finely, densely granulose.

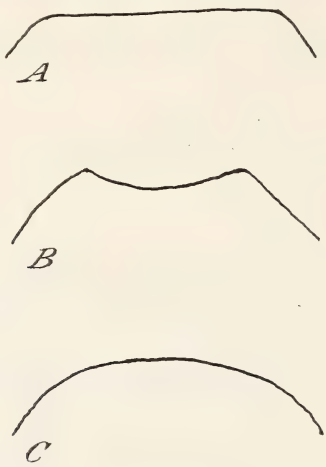

FIGURE 105.—Clypeus (*A*), and last visible abdominal sternite of male (*B*) and of female (*C*) of *Chrysobothris platti*.

Elytra slightly wider than pronotum, about one and two-third times as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded, but not extending to tip of abdomen; lateral margins slightly serrate; basal depressions very deep; humeral depressions broad and barely indicated; surface glabrous, obsoletely, longitudinally costate, rather densely, finely, irregularly punctate, intervals distinctly, densely, finely granulose.

Abdomen beneath very sparsely, finely, irregularly punctate, clothed with a few short, semierect, inconspicuous hairs, without lateral callosities, intervals obsoletely granulose; last visible sternite broadly, obtusely rounded and slightly sinuate at apex, with a slightly elevated, sinuate, subapical ridge, lateral margins not serrate or interrupted; eighth tergite densely, coarsely punctate, densely granulose, broadly rounded at apex. Prosternum coarsely, confluently punctate, clothed with a few short, inconspicuous hairs, narrowly, transversely depressed anteriorly; anterior margin deflexed, slightly rounded, but without a median lobe. Anterior femur with a short, obtuse tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae arcuate, unarmed; posterior tibia straight.

Length 12 mm., width 4 mm.

Redescribed from the female holotype in the collection of Mont A. Cazier, and the male allotype in the collection of A. F. McClay.

Male.—Differing from the female in having the last visible sternite broadly, shallowly emarginate at the apex. Genitalia not examined.

Length 10 mm., width 4 mm.

Type locality.—Snow Creek, Riverside County, Calif.

Distribution.—The only two specimens examined were the female holotype collected at the type locality, June 8, 1936, by F. R. Platt,

and the male allotype collected at Whitewater, Riverside County, June 27, 1937, by A. T. McClay.

Host.—The larval habits are unknown, but the female holotype was collected on *Ephedra* sp. by Mr. Platt.

(112) CHRYSOBOTHRIS ALLENI Cazier

(Fig. 106; fig. 126, *E*)

Chrysobothris alleni Cazier, 1938, South. Calif. Acad. Sci. Bul. 37: 15–17.

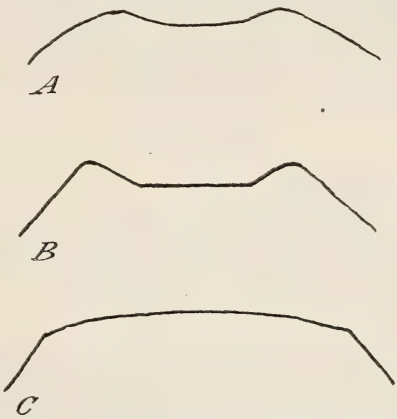

FIGURE 106.—Clypeus (*A*), and last visible abdominal sternite of male (*B*) and of female (*C*) of *Chrysobothris alleni.*

Female.—Rather broadly elongate, strongly convex above, moderately shining, bright green, with a faint golden tinge; beneath bluish green.

Head bronzy green on vertex and occiput, becoming bluish green toward clypeus, with an obscure longitudinal carina on occiput, terminating anteriorly in a small, shallow depression on vertex; front slightly convex; surface coarsely, rather densely, shallowly, irregularly punctate on vertex and occiput, coarsely, deeply, irregularly ocellate-punctate on front, sparsely clothed behind clypeus with short, inconspicuous hairs, intervals finely alutaceous; clypeus broadly, shallowly, arcuately emarginate in front, slightly rounded on each side. Antenna bronzy green basally, cupreous apically, nearly equal in width to apex; intermediate segments not compact, strongly triangular, as long as wide, acutely angulated at outer margins; third segment elongate-triangular, as long as following three segments united.

Pronotum twice as wide as long, narrower at apex than at base, widest just behind middle; sides obtusely rounded just behind middle, arcuately converging anteriorly and posteriorly; anterior margin slightly, arcuately emarginate, with a broadly rounded median lobe; base truncate on each side, median lobe strongly produced and broadly rounded; disk strongly convex, with a broad, indistinct, median depression, but without smooth callosities; surface glabrous, densely, deeply, rugosely punctate, intervals faintly alutaceous.

Elytra at base subequal in width to pronotum at middle, about one and one-half times as long as wide, widest at apical third; sides slightly diverging from humeral angles to apical third, then arcuately converging to tips, which are separately broadly rounded, but not extending to tip of abdomen; lateral margins slightly serrate; basal depressions very deep, but without distinct humeral depressions; surface glabrous, slightly uneven, coarsely, deeply, irregularly punctate, more or less rugose basally, intervals finely, densely granulose.

Abdomen beneath glabrous, coarsely, sparsely, irregularly punctate, more densely punctate on apical sternites, without lateral callosities, intervals finely, densely granulose: last visible sternite broadly, obtusely rounded at apex, without a submarginal ridge, lateral margins not serrate; eighth tergite densely,

coarsely punctate, finely granulose, broadly rounded at apex. Prosternum glabrous, coarsely, deeply, rather densely punctate, deeply, broadly, transversely concave anteriorly; anterior margin truncate, without a median lobe. Anterior femur with a short, acute tooth, which is not dentate on outer margin. Anterior tibia distinctly arcuate, unarmed; middle tibia slightly arcuate; posterior tibia straight.

Length 12 mm., width 5 mm.

Redescribed from the female holotype in the collection of Mont. A. Cazier.

Male.—Differing from the female in having the antenna strongly bipectinate from the fourth segment, with the internal ramus of each segment slightly longer than the external one, and the last segment bifurcate, the last visible sternite very broadly, shallowly emarginate at apex, the eighth tergite more sparsely punctate, and the anterior and middle tibiae more strongly arcuate.

Type locality.—Twenty miles east of Tuba City, Ariz.

DISTRIBUTION

From material examined:

ARIZONA: No definite locality, one male. Near Tuba City, July 22, 1937, female holotype, male allotype, and male and female paratypes (R. P. Allen). Woodruff, June 26, one female.

COLORADO: Five miles north of Delta, June 30, 1938, one male (R. Bauer).

Host.—Unknown.

Very little variation was observed in the few specimens examined. In the male allotype the pronotum is widest at the middle, with the sides uniformly rounded, and in one of the paratypes there are two vague purplish-black spots on each elytron, but these can be seen only in certain lights, and the clypeus is a little more deeply emarginate in some specimens. The color varies from bluish green to golden green. The length is from 11 to 13.5 mm.

This species resembles *platti* Cazier, but it differs from that species in having the clypeus shallowly emarginate in front, the dorsal surface of the body shining, the anterior femur armed with an acute tooth, which is not dentate on the outer margin, and the antenna of the male bipectinate.

(113) CHRYSOBOTHRIS BICOLOR Horn

(Fig. 107; fig. 126, *F*)

Chrysobothris bicolor Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 328, 366–367; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 139; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 612.

Female—Broadly elongate, moderately convex above, slightly shining; pronotum uniformly purplish brown; elytra uniformly violaceous, with more or less distinct greenish and bluish reflections in different lights; beneath purplish brown at sides, greenish blue to bronzy brown on median parts, and slightly more strongly shining than above.

Head uniformly purplish brown, slightly cupreous, with a vague, smooth chevron on vertex, and a vague, narrow, longitudinal carina on occiput; front nearly flat; surface coarsely, densely punctate, slightly rugose behind clypeus, sparsely, uniformly clothed with short, semierect, white hairs, intervals indistinctly granulose; clypeus broadly, rather deeply, subangularly emarginate in front, arcuately rounded on each side. Antenna uniformly purplish, gradually narrowed to apex; intermediate segments compact, distinctly wider than long, broadly rounded at outer margins: third segment as long as following three segments united.

FIGURE 107.—Anterior tibia of male (*A*), clypeus (*B*), and last visible abdominal sternite of male (*C*) and of female (*D*) of *Chrysobothris bicolor*.

Pronotum twice as wide as long, slightly narrower at apex than at base, widest along middle; sides nearly parallel (slightly sinuate at middle), obliquely truncate at apical angles; posterior angles fitting closely to elytra; anterior margin moderately sinuate, with an indistinct, broadly rounded, median lobe; base broadly, deeply, arcuately emarginate on each side, median lobe broadly rounded, truncate in front of scutellum; disk moderately, uniformly convex, without callosities or depressions; surface glabrous, coarsely, uniformly, densely, deeply punctate, intervals finely granulose.

Elytra at base slightly wider than pronotum at middle, one and three-fourths times as long as wide; sides nearly parallel from humeral angles to apical third, then arcuately converging to tips, which are conjointly broadly rounded; lateral margins coarsely serrate posteriorly; basal depressions broad and moderately deep; humeral depressions vaguely indicated; disk moderately convex, with a broad depression on each side near middle, without distinct longitudinal costae or foveae; surface glabrous, coarsely, densely punctate, more or less transversely rugose near base and lateral margins, intervals densely granulose.

Abdomen beneath coarsely, sparsely, irregularly punctate, more densely on last sternite, sparsely clothed with short, recumbent, white hairs, without lateral callosities, intervals finely granulose; last visible sternite bisinuate at apex, lateral angles acutely produced, and with a strongly elevated, very coarsely serrate, submarginal ridge, surface broadly depressed at middle, but lateral margins not serrate; eighth tergite convex, coarsely, confluently punctate, broadly rounded at apex. Prosternum declivous along anterior margin, coarsely, densely punctate, with a few, short, recumbent, whitish hairs; anterior margin arcuately rounded, with a short, wide, median lobe. Anterior femur with a large, acutely triangular tooth, which is coarsely dentate on outer margin. Anterior tibia slightly arcuate, unarmed at apex; middle and posterior tibiae straight.

Length 9 mm., width 3.8 mm.

Redescribed from a female topotype, No. 3449, from San José del Cabo, Lower California, in the Academy of Natural Sciences of Philadelphia.

Male.—Differing from the female in having the last visible abdominal sternite broadly, rather deeply, arcuately emarginate at apex, and the anterior tibia armed with a narrow, elongate dilation at apex.

Type locality.—San José del Cabo, Lower California; type in the California Academy of Sciences.

DISTRIBUTION

From material examined:

LOWER CALIFORNIA: San José del Cabo. Santa Rosa and San Felipe (G. Beyer). Triunfo, July 13, 1938 (Michelbacher and Ross).

Chamberlin (1926) and Obenberger (1934) record this species from Arizona and Texas, but no specimens have been seen by the writer from either of these two States, and these localities may be incorrect.

Host.—Unknown.

Very little variation was observed in the few specimens examined except in color and size. The color on the pronotum varies from purplish brown to bronzy green, and on the elytra from violaceous blue to greenish blue. The length is from 5.5 to 9 mm.

Horn described this species from a single specimen (which he misidentified as a male), probably collected by Gustav Eisen. Dr. Linsley has compared the redescription with the type, which proved to be a female.

(114) CHRYSOBOTHRIS SMARAGDULA Fall

(Fig. 108)

Chrysobothris smaragdula Fall, 1907, Canad. Ent. 39: 239–240; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 172; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 652.

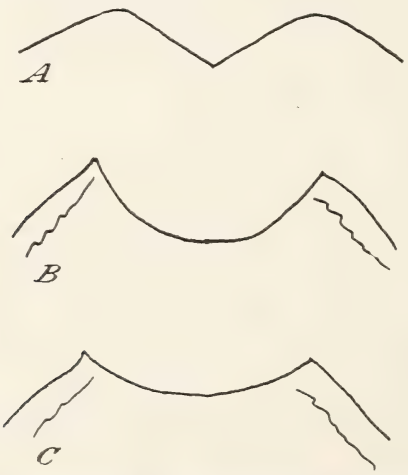

FIGURE 108.—Clypeus (*A*), and last visible abdominal sternite of male (*B*) and of female (*C*) of *Chrysobothris smaragdula.*

Female.—Moderately elongate, rather strongly convex above, moderately shining, bright green, with a faint bluish tinge; beneath dark bluish green, with a faint violaceous reflection, and more strongly shining than above.

Head uniformly dark green, broadly, deeply depressed on vertex and occiput; front slightly convex; surface coarsely, rather densely, irregularly punctate, more or less rugose behind clypeus, sparsely clothed with very short, erect, inconspicuous hairs; clypeus deeply, angularly emarginate in front, arcuately rounded on each side. Antenna brownish cupreous, greenish on basal segments, distinctly narrowed to apex; intermediate segments compact, nearly square, broadly subtruncate at outer margins; third segment slightly longer than following two segments united.

Pronotum twice as wide as long, subequal in width at base and apex, widest along middle; sides parallel for nearly their entire length, slightly converging at apical and posterior angles; anterior margin truncate; base broadly, arcuately emarginate on each side, median lobe slightly produced and broadly rounded; disk uniformly convex, without depressions or callosities; surface coarsely, densely, uniformly punctate, distinctly, transversely rugose, intervals densely granulose.

Elytra slightly wider than pronotum, nearly twice as long as wide; sides parallel from humeral angles to behind middle, then arcuately converging to tips, which are separately narrowly rounded; lateral margins coarsely serrate; basal depressions broad and moderately deep; humeral depressions obsolete; disk moderately convex, slightly uneven; surface glabrous, without foveae or costae, coarsely, densely, uniformly punctate, transversely rugose, intervals densely granulose.

Abdomen beneath coarsely, rather sparsely, uniformly punctate, sparsely clothed toward sides with very short, recumbent, inconspicuous, white hairs, intervals densely granulose, without lateral callosities; last visible sternite shallowly, broadly emarginate at apex, with a strongly elevated, coarsely serrate, submarginal ridge, which is transversely truncate in front of apex, lateral margins slightly sinuate, but not serrate; eighth tergite not visible. Prosternum coarsely, densely punctate, coarsely, transversely rugose, with a few very short, inconspicuous hairs, anterior margin rounded, with a rather broad, short, median lobe. Anterior femur with a short, broad, triangular tooth, which is coarsely dentate on outer margin. Anterior tibia strongly arcuate, unarmed; middle and posterior tibiae straight.

Length 6 mm., width 2.25 mm.

Redescribed from the type in the Fall Collection (in the Museum of Comparative Zoology, Cambridge, Mass.).

Male.—Differing from the female in having the last visible abdominal sternite more deeply emarginate at apex. The genitalia are similar to those of *bicolor*. The anterior tibia is unarmed in both sexes.

Type locality.—"Oak Creek Canyon, 6,000 feet, Ariz., July, F. H. Snow."

Host.—Unknown.

Fall described the species from a single female, and the only other specimen examined by the writer is a male collected June 30, 1939, at Prescott, Ariz., by D. J. and J. N. Knull, and a male collected at Globe, Ariz., by D. K. Duncan.

(115) Chrysobothris prasina Horn

(Fig. 109)

Chrysobothris prasina Horn, 1886, Amer. Ent. Soc. Trans. 13: 116, 118, pl. 7, figs 244–247; Kerremans, 1892, Soc. Ent. de Belg. Mém. 1: 218; Horn, 1894, Calif. Acad. Sci. Proc. (ser. 2) 4: 369; Fall, 1901, Calif. Acad. Sci. Occas. Papers 8: 22, 118; Schaeffer, 1904, N. Y. Ent. Soc. Jour. 12: 206 (= *purpureoplagiata*); Fall, 1907, Canad. Ent. 39: 240; Woodworth, 1913, Guide to California Insects, p. 196; Chamberlin, 1917, Ent. News 28: 139; 1926, Cat. Buprestidae North Amer., p. 166; 1929, Pan-Pacific Ent. 5: 115; Van Dyke, 1934, Ent. News 45: 90; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 645.

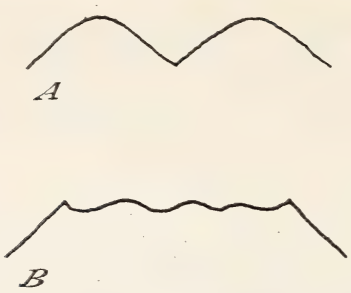

FIGURE 109.—Clypeus (*A*) and last visible abdominal sternite (*B*) of female of *Chrysobothris prasina*.

Female.—Rather broadly elongate, moderately convex above, moderately shining, uniformly bright green, with a faint golden tinge; beneath violaceous black, with a greenish reflection at middle, and more strongly shining than above.

Head bright green, without distinct callosities or longitudinal carinae; front slightly convex; surface rather densely, coarsely, shallowly punctate, without distinct pubescence, intervals distinctly granulose; clypeus deeply, triangularly emarginate in front, arcuately rounded on each side. Antenna brownish, slightly bronzy green on basal segments, gradually narrowed to apex; intermediate segments compact, subquadrate, wider than long, broadly rounded at outer margins; third segment slightly longer than following two segments united.

Pronotum nearly twice as wide as long, subequal in width at base and apex, widest near basal fourth; sides nearly parallel (slightly converging from basal fourth to apex), arcuately converging near base; posterior angles broadly rounded; anterior margin nearly truncate, with an obscure, broadly rounded, median lobe; base broadly, arcuately emarginate on each side, median lobe slightly produced, and subtruncate in front of scutellum; disk moderately convex, without callosities or depressions; surface finely, rather sparsely punctate, more coarsely densely toward sides, vaguely, transversely rugose, intervals finely granulose.

Elytra at base slightly wider than pronotum at middle, nearly twice as long as wide; sides parallel anteriorly, arcuately expanded behind middle, then arcuately converging to tips, which are conjointly broadly rounded; lateral margins coarsely serrate posteriorly; basal depressions broad and rather deep; humeral depressions shallow and broad; surface glabrous, without costae or foveae, finely, densely, uniformly punctate, punctures finer and sparser toward apices, and intervals finely granulose.

Abdomen beneath sparsely, finely punctate, glabrous, without lateral callosities, intervals indistinctly granulose; last visible sternite sinuately truncate at apex, without a submarginal ridge, the lateral margins not serrate; eighth tergite densely punctate, broadly rounded at apex. Prosternum glabrous, densely, coarsely punctate at middle, smooth toward sides; anterior margin broadly, arcuately rounded, but not distinctly lobed at middle. Anterior femur with a short, broadly rounded tooth, which is coarsely dentate on outer margin. Anterior and middle tibiae arcuate, unarmed at apices; posterior tibia straight.

Length 7 mm., width 3 mm.

Male.—Unknown.

Redescribed from the female holotype, No. 3447, in the Academy of Natural Sciences of Philadelphia.

Type locality.—"California", no definite locality given, but probably from the northern part.

Distribution.—The only specimen examined was the type. It is recorded by Fall (1901) from Pasadena, Calif., in the Fenyes collection, and by Chamberlin (1917, 1926) from Sonoma County and Alameda, Calif.

Host.—Unknown.

UNRECOGNIZED AND FOSSIL SPECIES

(116) Chrysobothris horni Kerremans

Chrysobothris horni Kerremans, 1903, *In* Wystman, Genera Insect., fasc. 12, p. 186; Leng, 1920, Cat. Coleopt., p. 183; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 157; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 636; Chamberlin, 1934, Pan-Pacific Ent. 10: 36.

Since this species has not been recognized by any of the American workers, it seems advisable to include the following copy of the original description:

"*Chrysobothris Horni.* Long. 9: larg. 3.6 mm.—♀, Subovalaire, plan en dessus, légèrement élargi au tiers supérieur, noir terne, un peu verdâtre, grenuleux. Dessous bronzé brillant légèrement poupré cuivreux et grossièrement punctué. Tête convexe, couverte d'une villosité argentée; front rugueux et ponctué avec deux reliefs lisses irréguliers; épistoma anguleusement échancré entre deux lobes arrondis; vertex finement caréné, la carène vaguement bifurquée en avant. Pronotum rugueux, subquadrangulaire, le disque vaguement sillonné. Elytres plans, inégalement chagrinés, sans dépressions ni fossettes irregulières, mais avec des vagues replis et des impressions peu nettes; les côtés dentelés a partir des hanches postérieurs jusq'au sommet. Dessous à ponctuation assez fortes et inégale; tibias antérieurs simples, à peine arqués à la base, dernier segment abdominal dentelé sur ses bords, vaguement caréné au milieu contre la base et déprimé près du sommet, celui-ci à peine bisinué avec un petit vide angueleux.—Etats-Unis d'Amérique."

(117) Chrysobothris lata Kerremans

Chrysobothris lata Kerremans, 1899, Soc. Ent. de Belg. Ann. 43: 336; Leng, 1920, Cat. Coleopt., p. 183; Chamberlin, 1926, Cat. Buprestidae North Amer., p. 159; Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 621; Chamberlin, 1934, Pan-Pacific Ent. 10: 36.

This is another species unrecognized by American workers. Obenberger (1934) placed it as a synonym of *dentipes* Germar, but the characters given by Kerremans for *lata* do not apply to *dentipes*. The following is a copy of Kerremans' original description:

"*Chrysobothris lata* nov. sp.—Écourté, peu convexe, bronzé cuivreux en dessus, d'un pourpré violacé en dessous.—Long., 12; larg., 5 mm. Florida.

Plus large et plus écourté que *Chrys. dentipes* Germ., des États Unis, différent de celui-ci par les détails qui suivant.

Tête légèrement convexe, couverte de reliefs vermiculés avec deux petites plaques lisses au milieu du front; plaque arrière-frontale nulle; vertex caréné. Pronotum plus large que haut, un peu plus étroit en avant qu-en arrière. couvert d'une ponctuation plus dense et plus fine dans les dépressions que sur les reliefs; ceux-ci inégaux, vermiculés et grossièrement ponctués; le milieu sillonné longitudinalement; la marge antérieure à peine échancrée en arc; les côtés tronqués en avant et droits en arrière avec l'angle inférieur abaissé et aigu; la base fortement bisinuée avec lè lobe médian subanguleux. Ecusson à peine sensible. Élytres larges, peu convexes, regulièrement atténues de la base au sommet, dentelés sur les côtés à partir du tiers supérieur jusqu'à l'extrémité, separément arrondis au sommet; ils présentent, de part et d'autre, des côtes irrégulières, interrompues par des dépressions transversales à fond granuleux et limitées par des côtes formant avec les premières un réseau irrégulier de mailles larges et inégales. Dessous grossièrement pouctué; prosternum large; dent fémorale aiguë; dernier segment abdominal triangulaire, à peine échancré au sommet."

(118) Chrysobothris sierrae Van Dyke

Chrysobothris sierrae Obenberger, 1934, *in* Junk (pub.), Coleopt. Cat., pt. 132, p. 652.

This belongs to the genus *Agrilus*, but Obenberger has erroneously placed it in the genus *Chrysobothris* in the paper listed above.

(119) CHRYSOBOTHRIS HAYDENI Scudder

Chrysobothris haydeni Scudder, 1876, U. S. Geol. and Geog. Survey of Ter. Bul. 2: 80; Wickham, *in* Leng, 1920, Cat. Coleopt., p. 355.

This fossil species was described from a single specimen, rather poorly preserved and obliquely crushed, and was obtained by the United States Geographical Survey of the Territories at Castellos Ranch, South Park, Colo. (No. 1722). Scudder stated that it is unquestionably a buprestid, but he placed it in *Chrysobothris* with some hesitancy.

(120) CHRYSOBOTHRIS SUPPRESSA Wickham

Chrysobothris suppressa Wickham, 1914, Harvard Univ. Mus. Compar. Zool. Bul. 58: 440–441, pl. 3, fig. 4; Wickham, *in* Leng, 1920, Cat. Coleopt., p. 355.

This fossil species was described from a single specimen collected in the Miocene shales at Florissant, Colo. Wickham states that there is no doubt of its being a true *Chrysobothris* but that he is unable to suggest its affinities with any of the numerous living North American species. Type No. 2483 in the Museum of Comparative Zoology (No. 6898, Scudder Collection).

(121) CHRYSOBOTHRIS COLORADENSIS Wickham

Chrysobothris coloradensis Wickham, 1914, Harvard Univ. Mus. Compar. Zool. Bul. 58: 441, pl. 3, fig. 5; Wickham, *in* Leng, 1920, Cat. Coleopt., p. 355.

This fossil species was described from a single specimen collected in the Miocene shales at Florissant, Colo. Wickham states that it is evidently a buprestid and probably a *Chrysobothris* related to *C. atrifasciata* or *C. ulkei*. Type No. 2484 in the Museum of Comparative Zoology (No. 3733, Scudder Collection).

(122) CHRYSOBOTHRIS GAHANI Cockerell

Chrysobothris gahani Cockerell, 1911, Amer. Mus. Nat. Hist. Bul. 30: 72, fig. 2; Wickham, *in* Leng, 1920, Cat. Coleopt., p. 355.

This fossil species was described from a specimen collected in the Miocene shales of Florissant, Colo. The location of the type is not given.

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ILLUSTRATIONS

(Figs. 110–126)

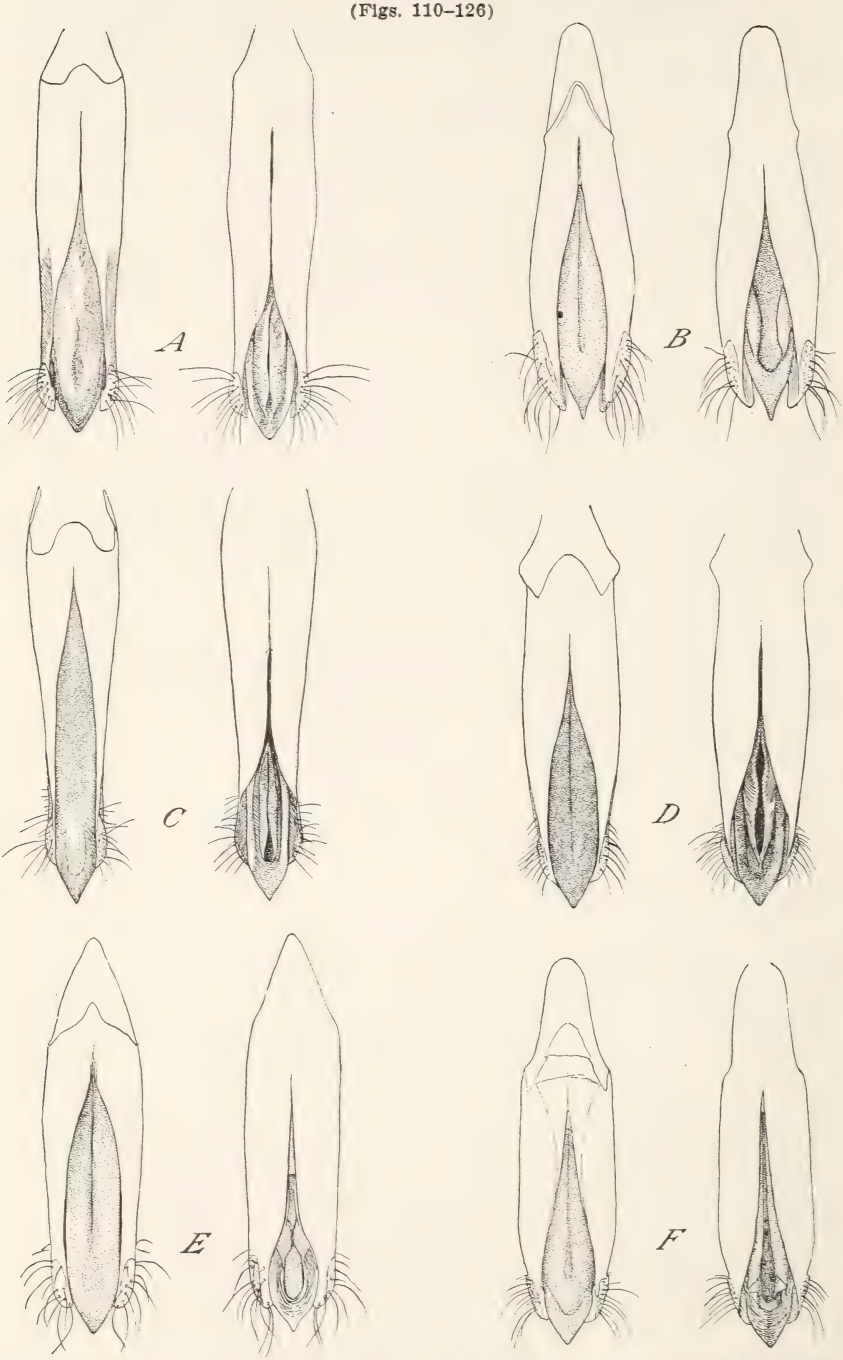

FIGURE 110.—Dorsal and ventral aspects of the male genitalia of (*A*) *Actenodes auronotata*, (*B*) *A. flexicaulis*, (*C*) *A. calcarata*, (*D*) *A. mendax*, (*E*) *A. arizonica*, and (*F*) *A. acornis*.

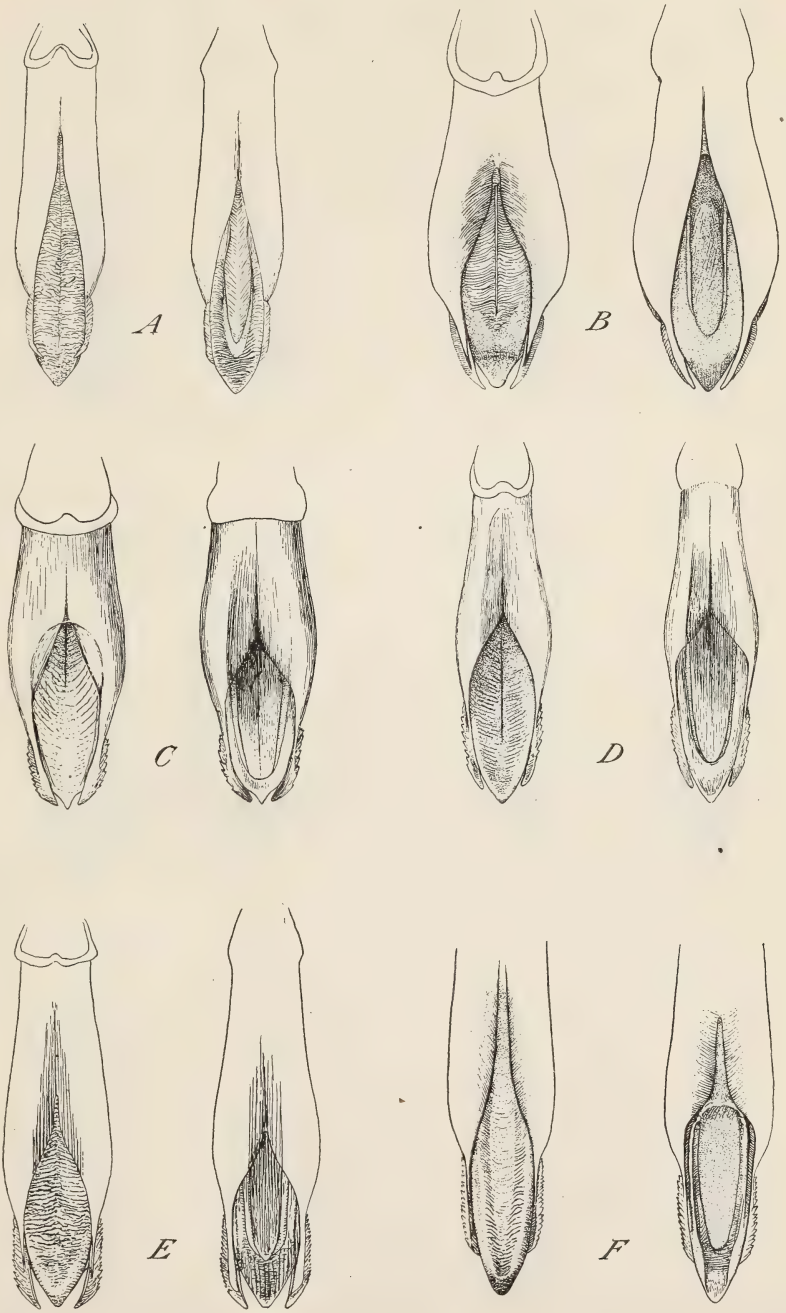

FIGURE 111.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris cyanella*, (*B*) *C. boharti*, (*C*) *C. lixa*, (*D*) *C. arizonica*, (*E*) *C. deleta*, and (*F*) *C. chamberlini*.

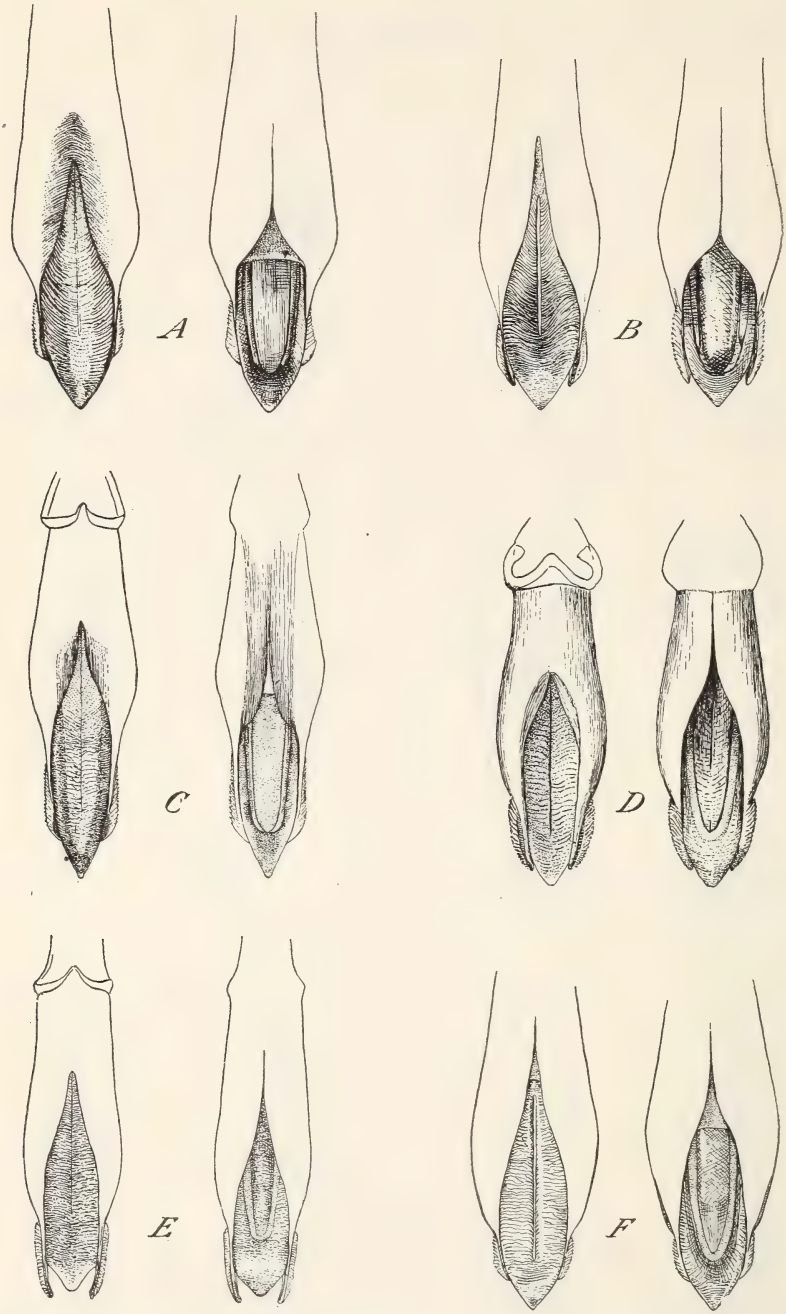

FIGURE 112.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris deserta*, (*B*) *C. atriplexae*, (*C*) *C. grindeliae*, (*D*) *C. fragariae*, (*E*) *C. pubescens*, and (*F*) *C. oregona*.

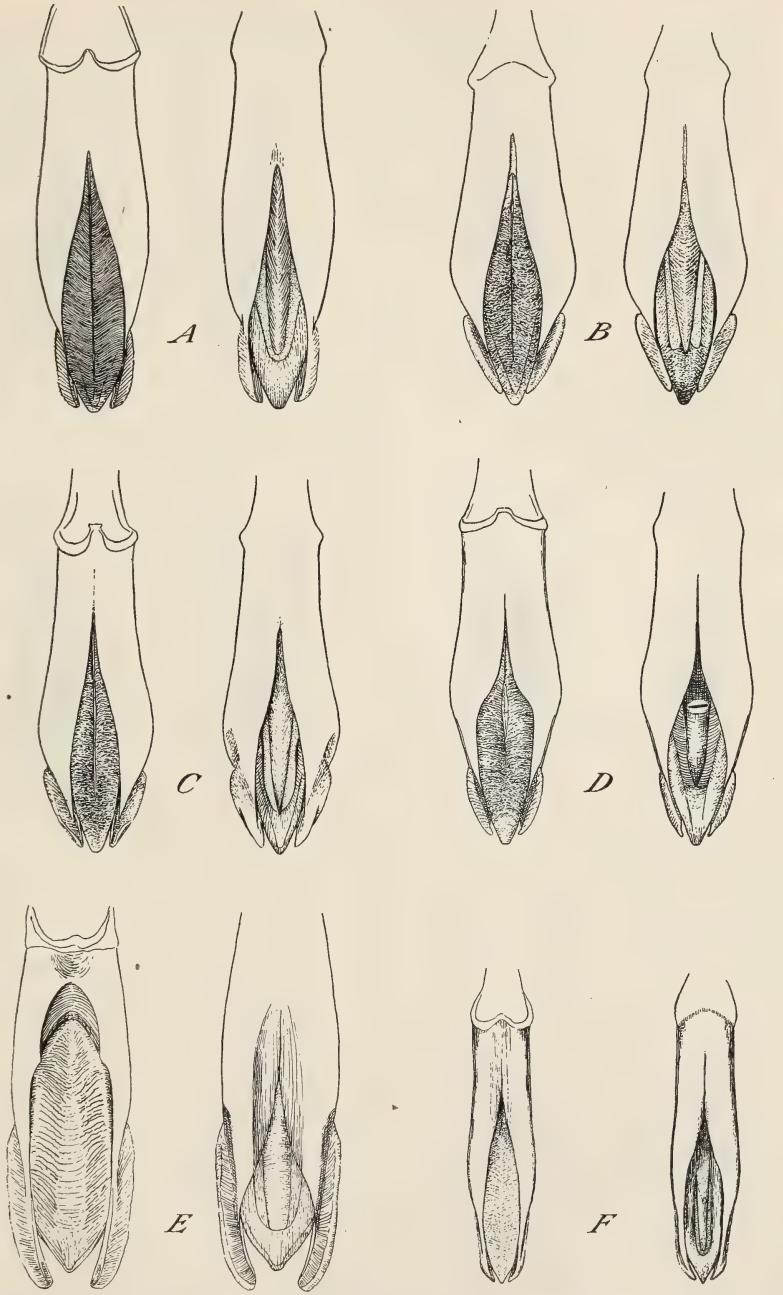

FIGURE 113.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris mali*, (*B*) *C. beyeri*, (*C*) *C. bacchari*, (*D*) *C. aeneola*, (*E*) *C. cupreohumeralis*, and (*F*) *C. prosopidis*.

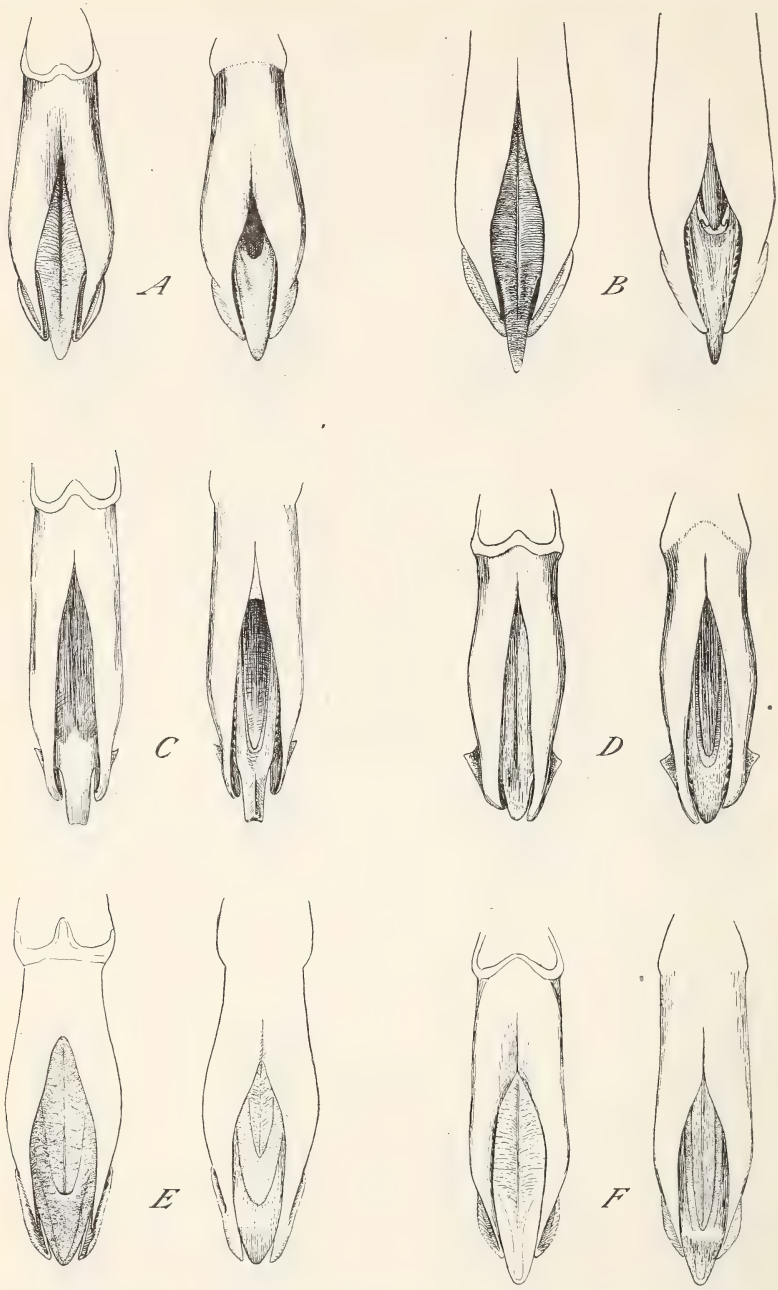

FIGURE 114.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris edwardsii*, (*B*) *C. schaefferi*, (*C*) *C. basalis*, (*D*) *C. octocola*, (*E*) *C. semisculpta*, and (*F*) *C. cuprascens*.

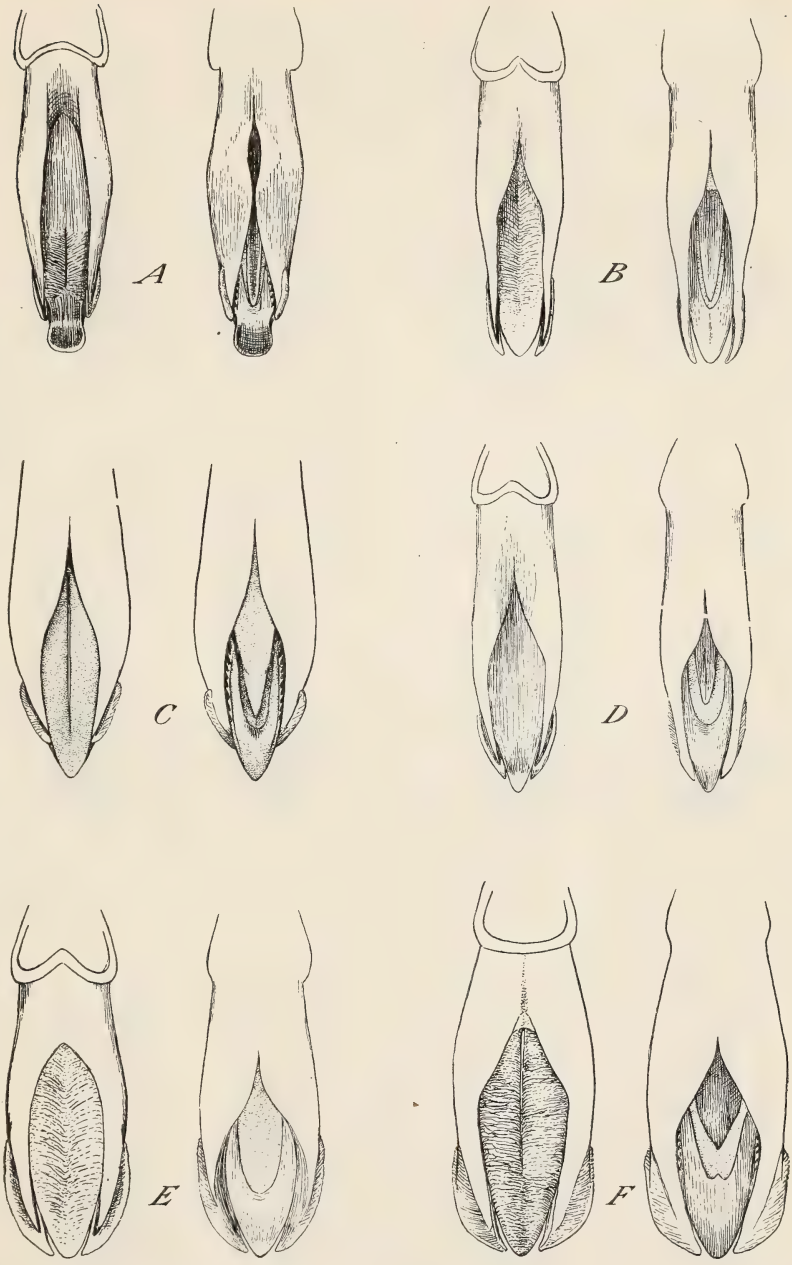

FIGURE 115.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris peninsularis*, (*B*) *C. texana*, (*C*) *C. helferi*, (*D*) *C. ignicollis*, (*E*) *C. speculifer*, and (*F*) *C. iris*.

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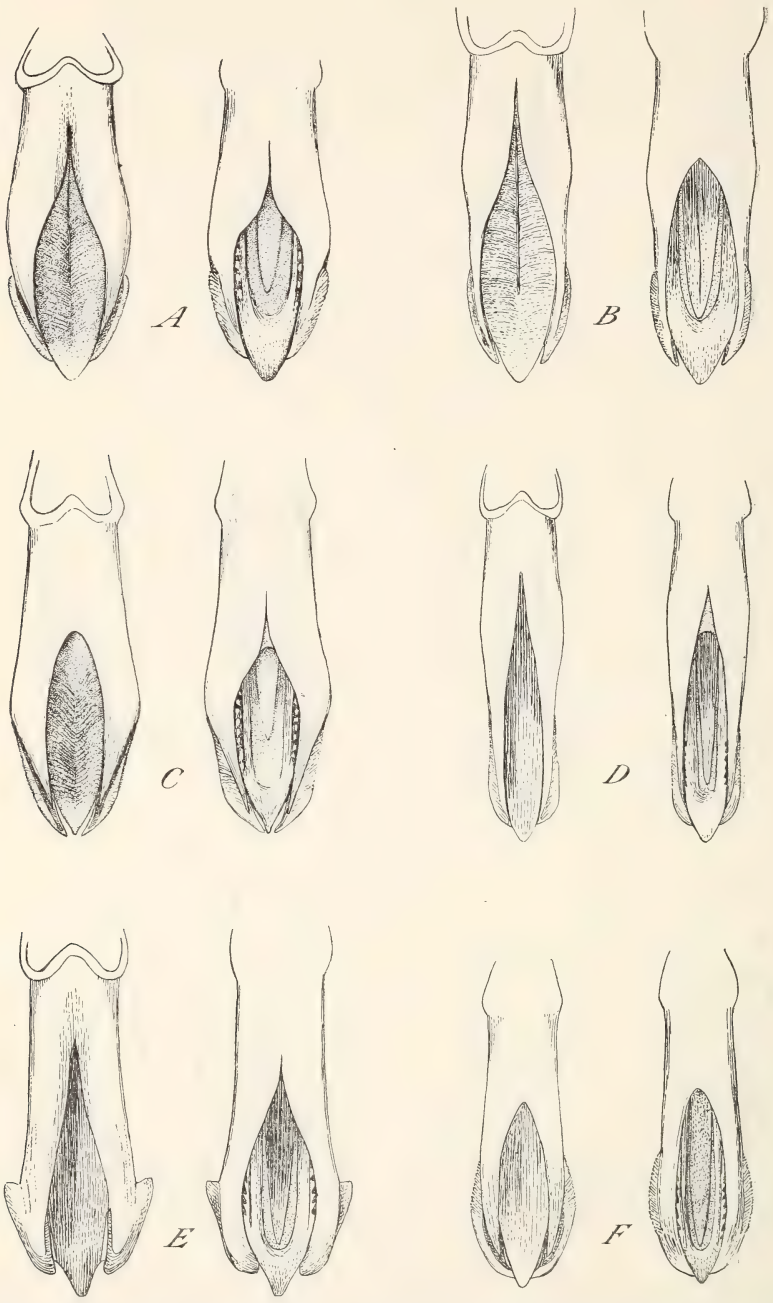

FIGURE 116.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris viridicyanea*, (*B*) *C. pusilla*, (*C*) *C. lateralis*, (*D*) *C. carmolita*, (*E*) *C. piuta*, and (*F*) *C. axillaris*.

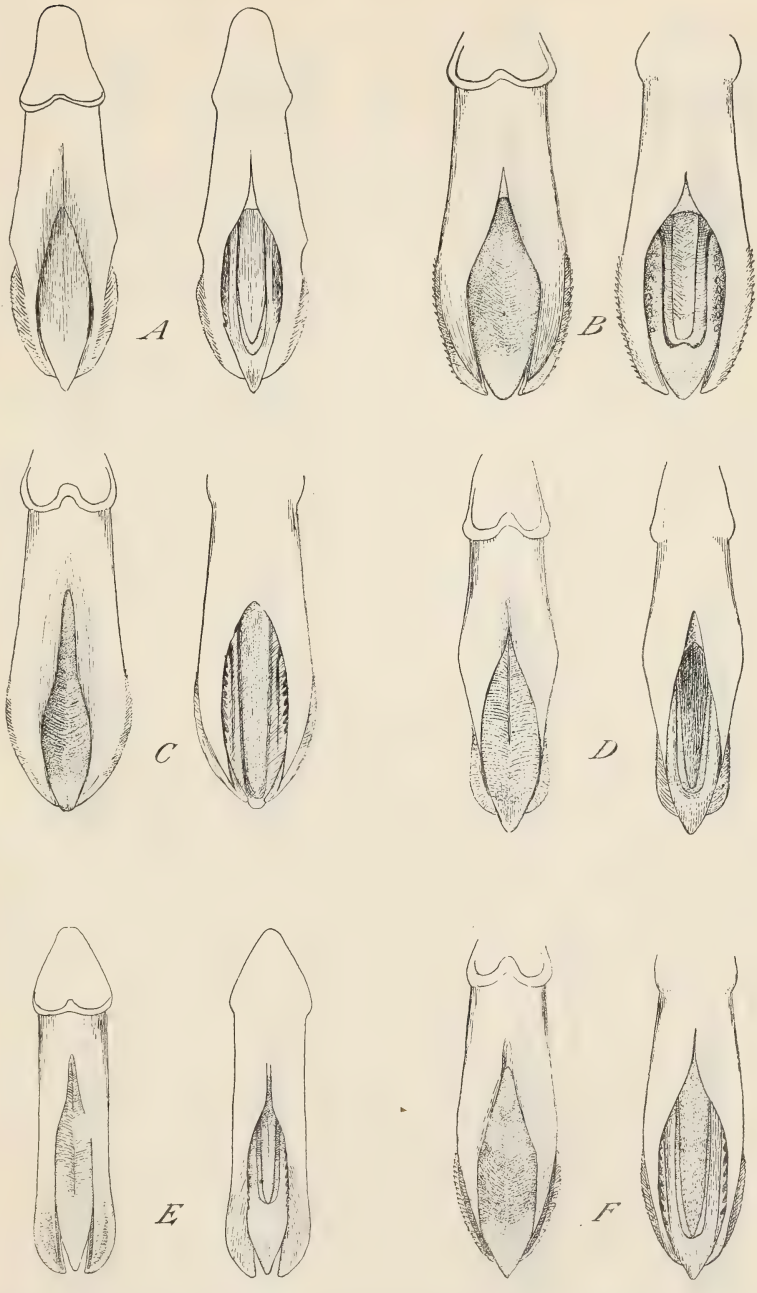

FIGURE 117.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris acaciae*, (*B*) *C. purpureoplagiata*, (*C*) *C. purpureovittata*, (*D*) *C. harrisi*, (*E*) *C. chiricahuae*, and (*F*) *C. micromorpha*.

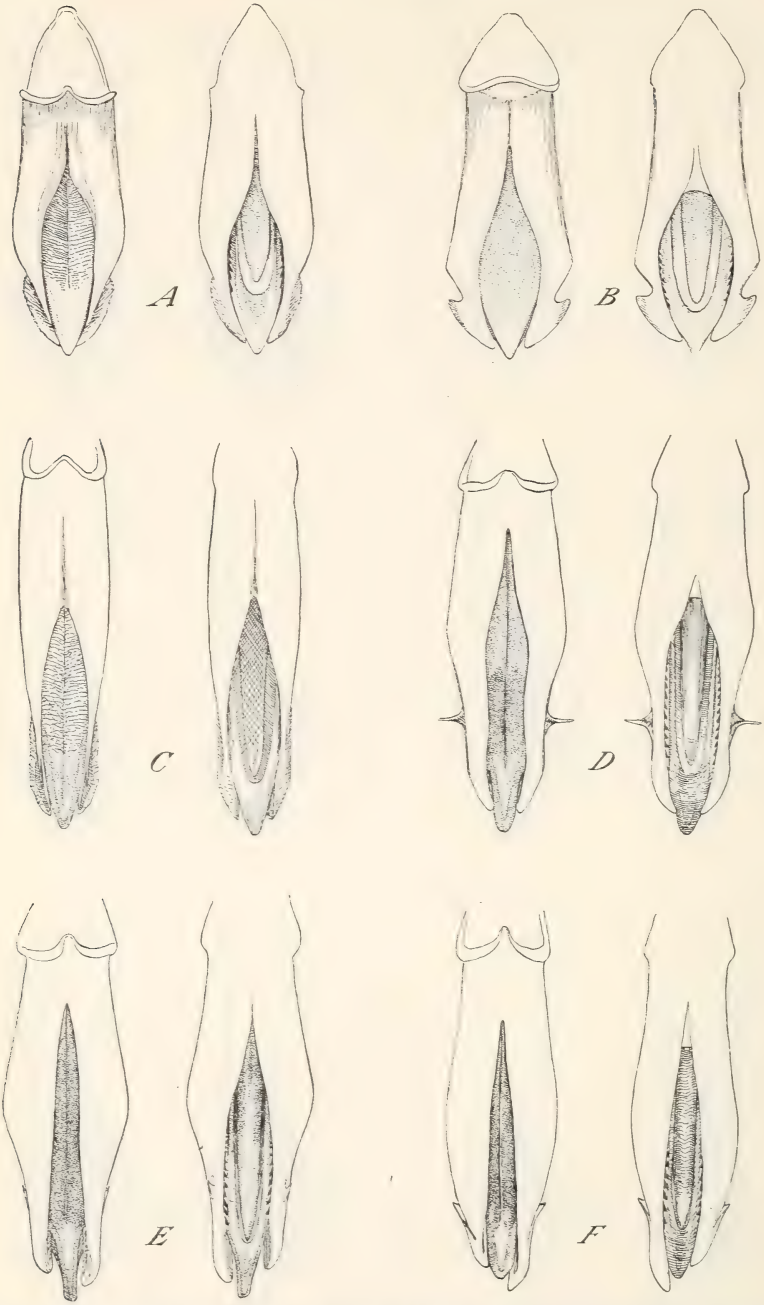

FIGURE 118.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris kelloggi*, (*B*) *C. parapiuta*, (*C*) *C. floricola*, (*D*) *C. adelpha*, (*E*) *C. rugosiceps*, and (*F*) *C. viridiceps*.

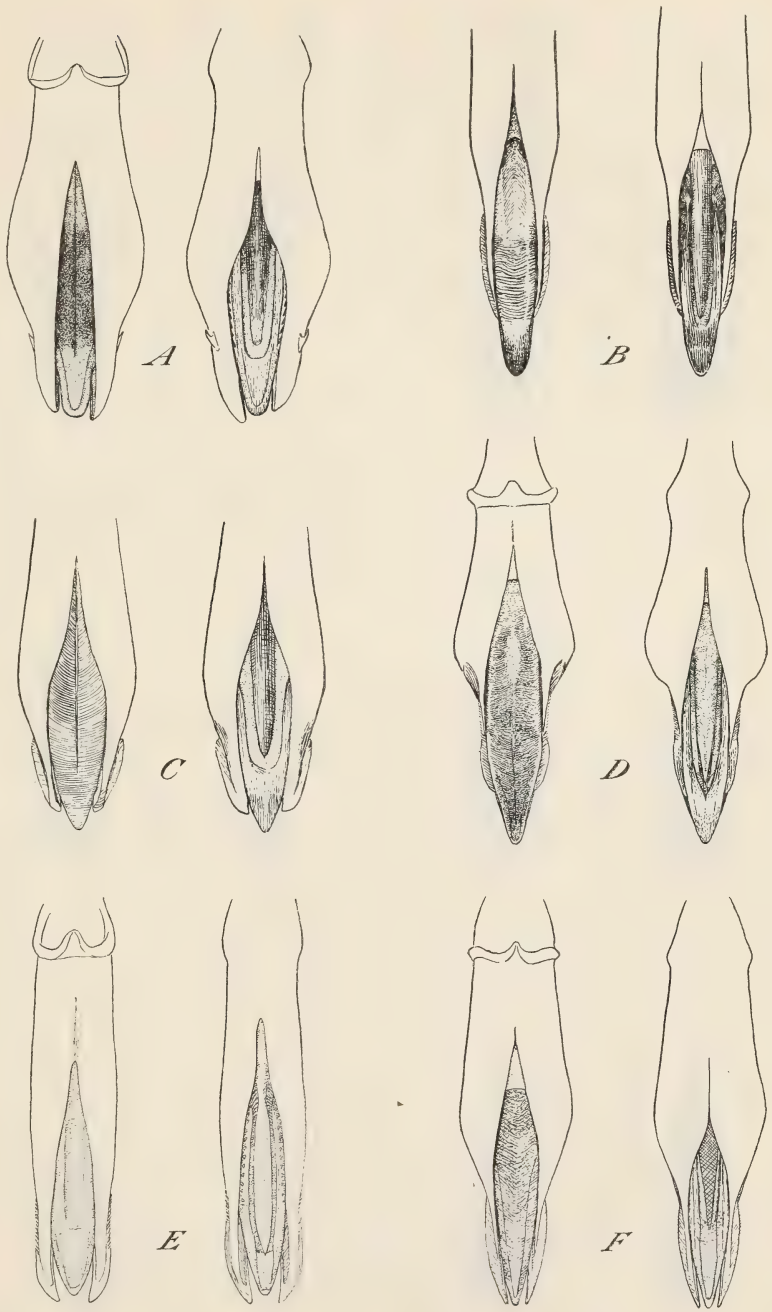

FIGURE 119.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris femorata*, (*B*) *C. juniperinus*, (*C*) *C. burkei*, (*D*) *C. verdigripennis*, (*E*) *C. exesa*, and (*F*) *C. dentipes*.

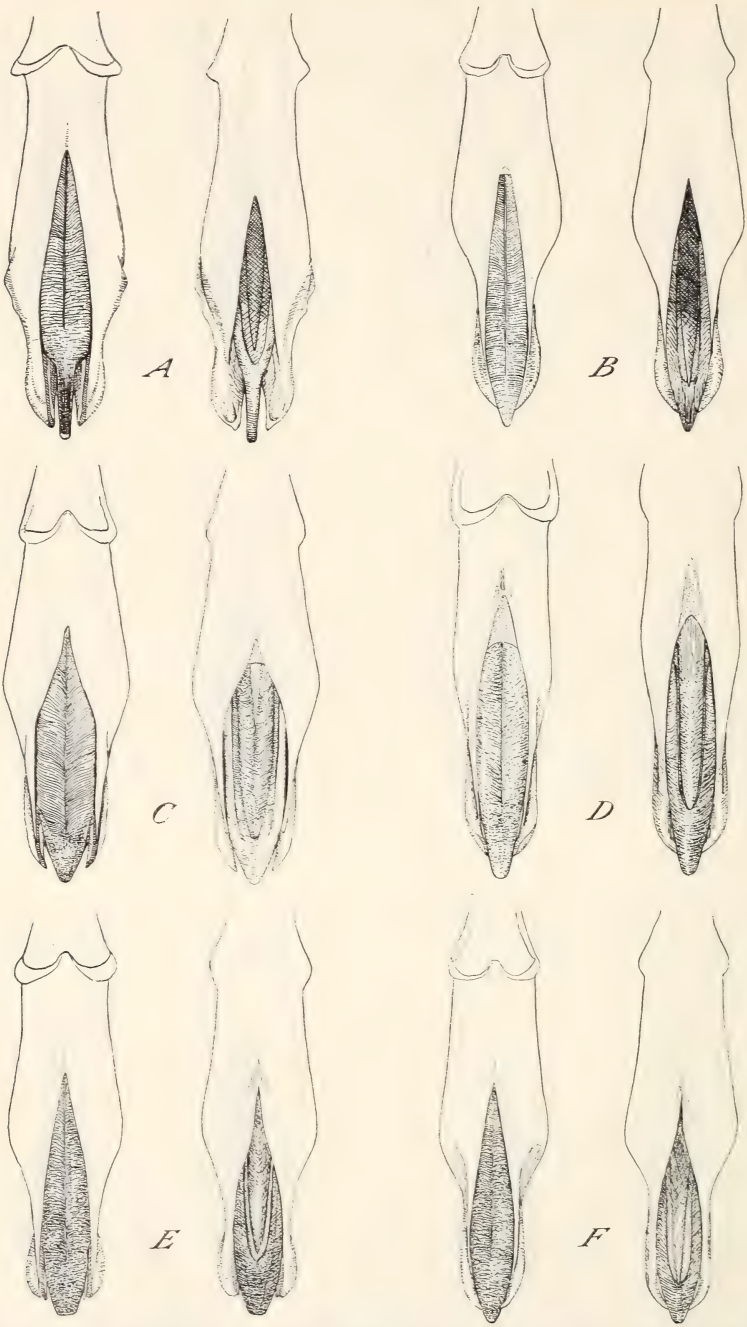

FIGURE 120.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris dolata*, (*B*) *C. ludificata*, (*C*) *C. quadrilineata*, (*D*) *C. nixa*, (*E*) *C. monticola*, and (*F*) *C. caurina*.

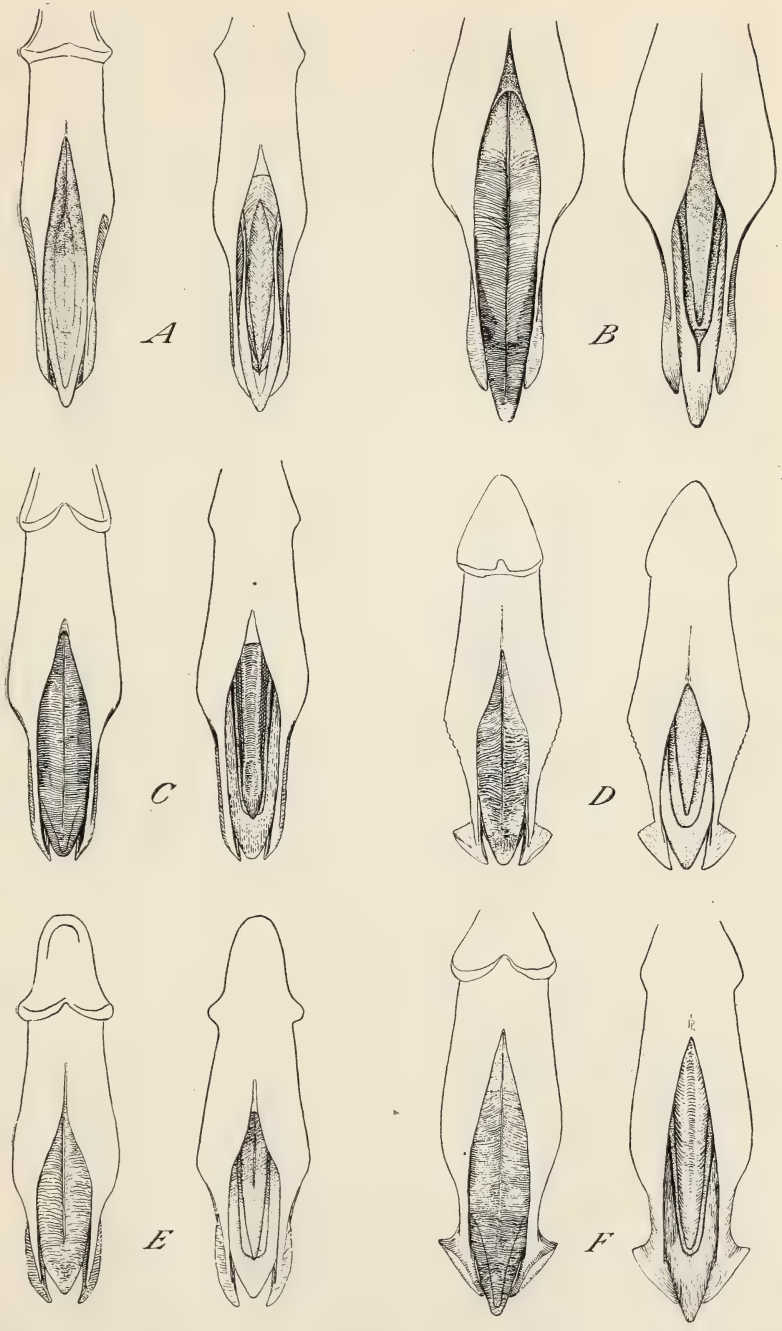

FIGURE 121.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris blanchardi*, (*B*) *C. canadensis*, (*C*) *C. californica*, (*D*) *C. woodgatei*, (*E*) *C. orono*, *and* (*F*) *C. scabripennis*.

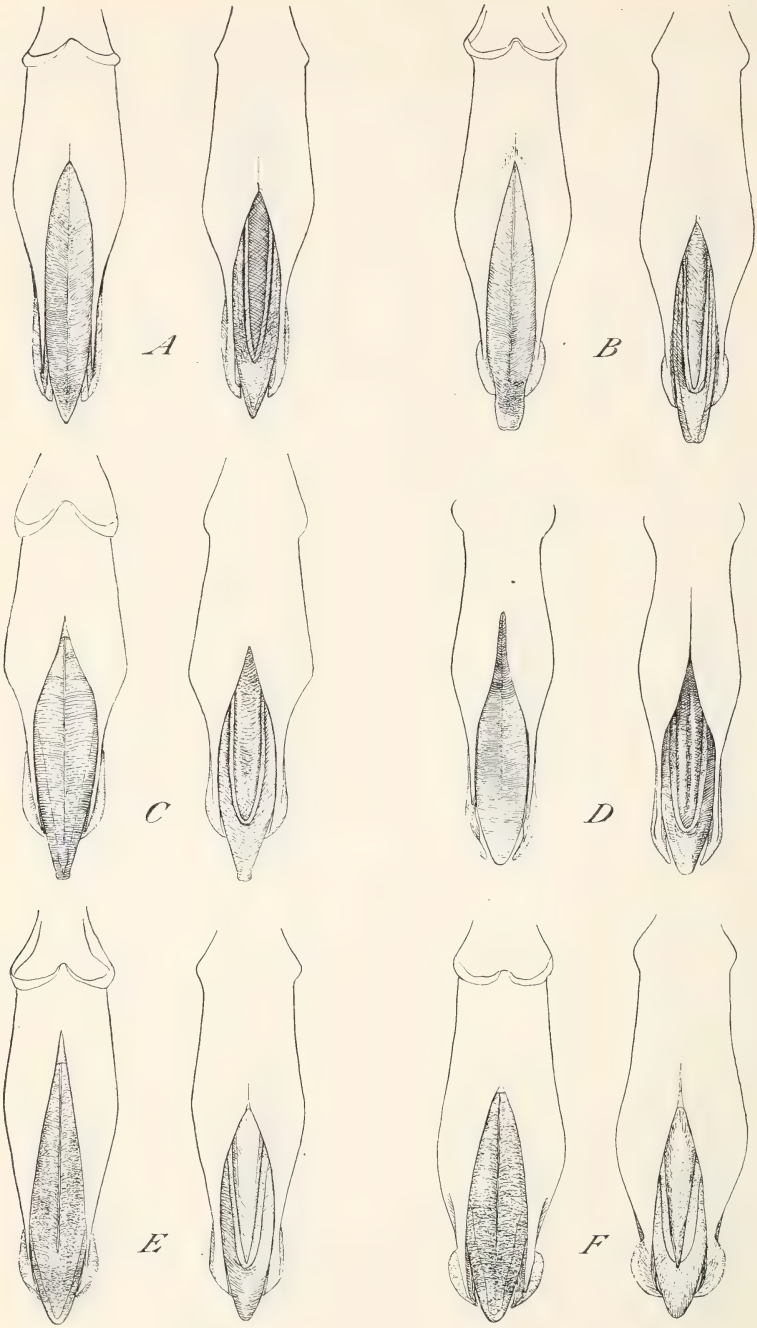

FIGURE 122.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris trinervia*, (*B*) *C. falli*, (*C*) *C. breviloba*, (*D*) *C. laricis*, (*E*) *C. sylvania*, and (*F*) *C. carinipennis*.

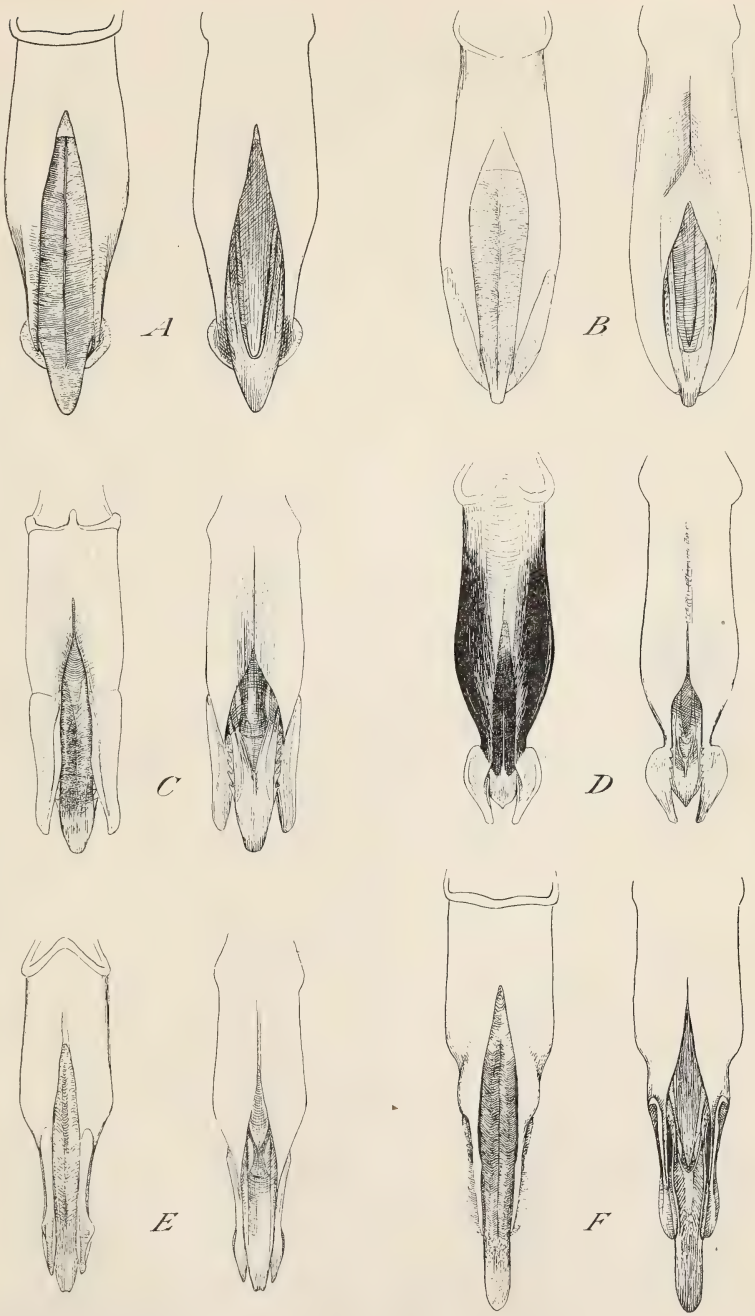

FIGURE 123.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris pseudotsugae*, (*B*) *C. libonoti*, (*C*) *C. costifrons*, (*D*) *C. tranquebarica*, (*E*) *C. acuminata*, and (*F*) *C. acutipennis*.

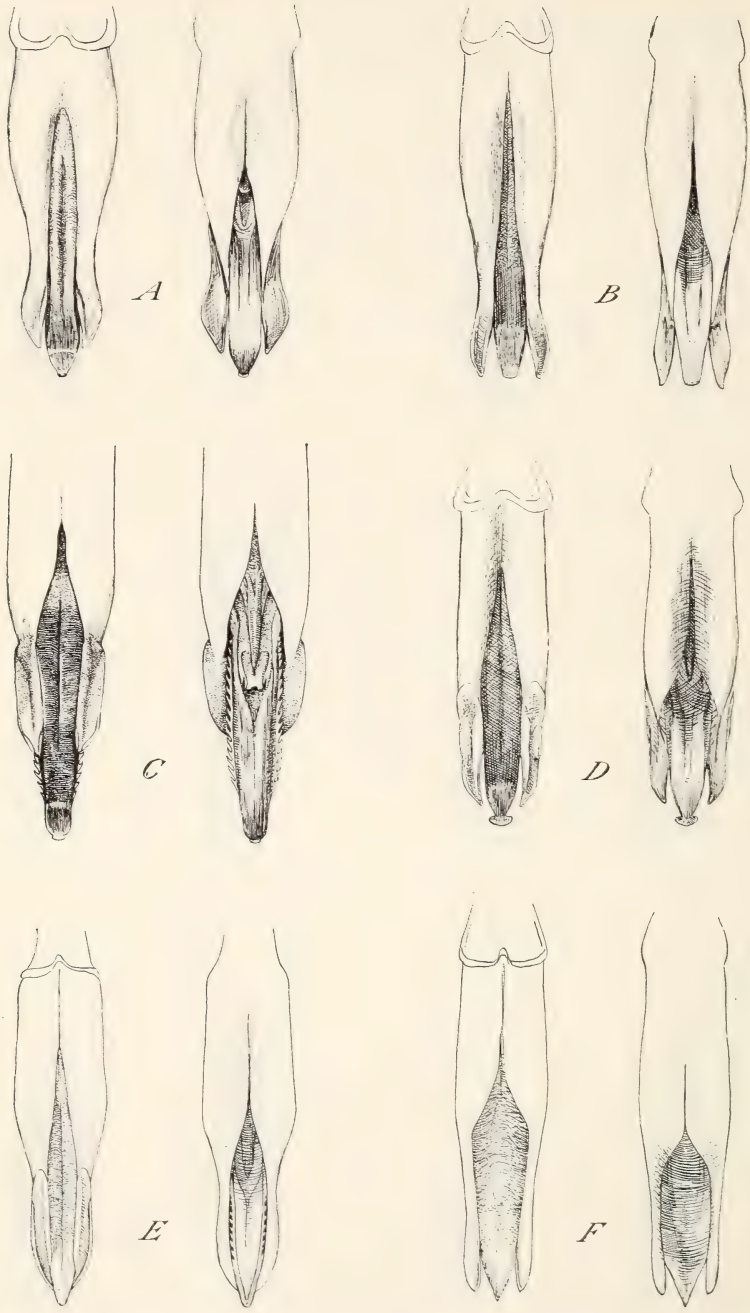

FIGURE 124.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris merkelii*, (*B*) *C. gemmata*, (*C*) *C. bispinosa*, (*D*) *C. serripes*, (*E*) *C. analis*, and (*F*) *C. chrysoela*.

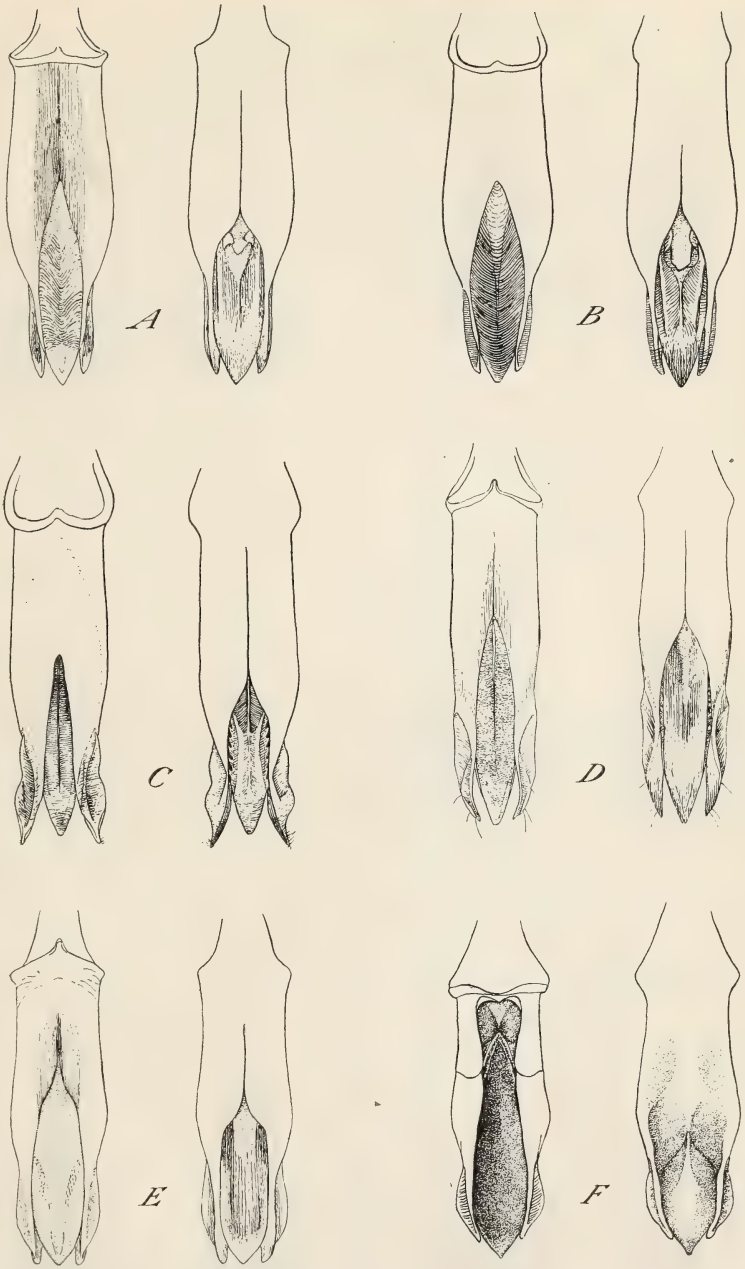

FIGURE 125.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris bimarginicollis*, (*B*) *C. fiskei*, (*C*) *C. azurea*, (*D*) *C. sexsignata*, (*E*) *C. concinnula*, and (*F*) *C. sexfasciata*.

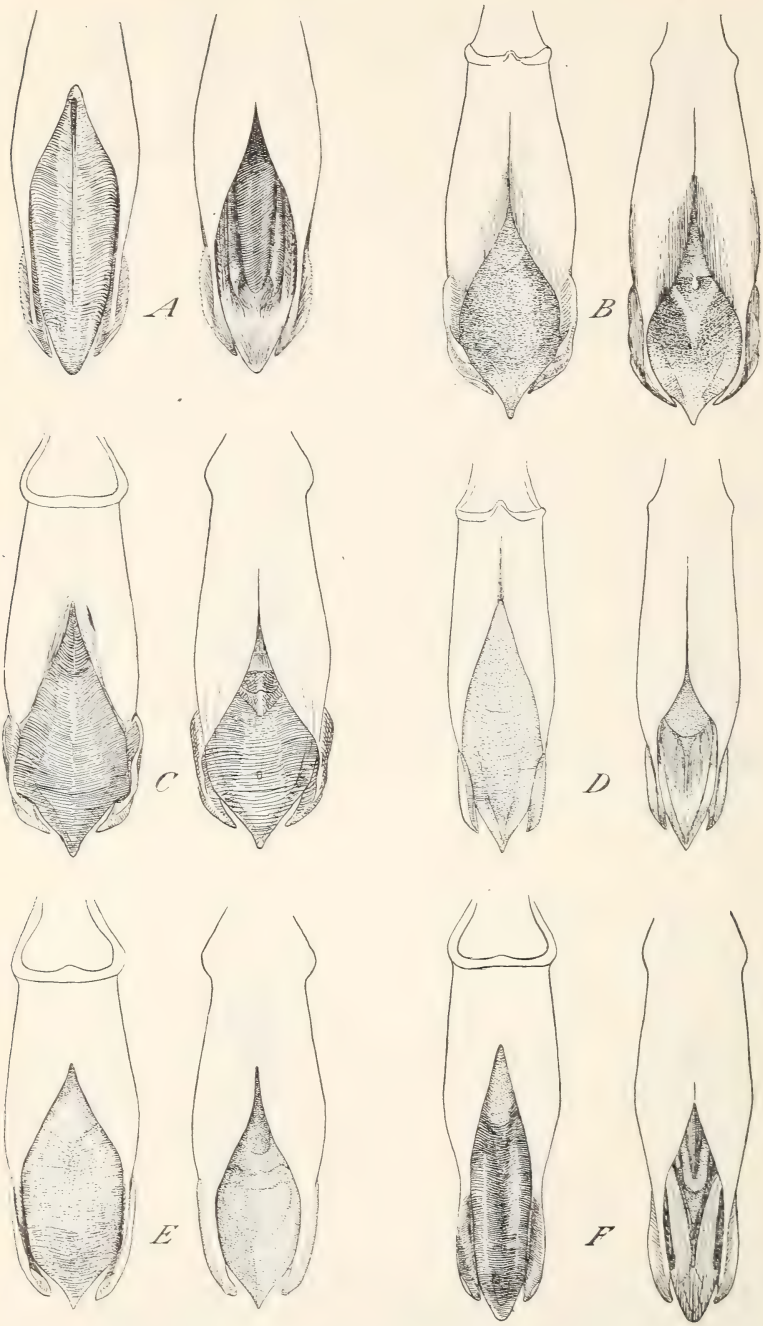

FIGURE 126.—Dorsal and ventral aspects of the male genitalia of (*A*) *Chrysobothris convexa*, (*B*) *C. atrifasciata*, (*C*) *C. socialis*, (*D*) *C. lucana*, (*E*) *C. alleni*, and (*F*) *C. bicolor*.

INDEX

[Valid names are in roman type, synonyms and nomina nuda in *italics*. Figures in **bold-faced** type indicate pages on which species are described.]

	Page
Actenodes Dejean	1, 2, 4, 5
acornis (Say)	5, 13
arizonica Knull	5, 12
auriguttata (Sturm)	6
auronota (Castelnau and Gory)	6
auronotata (Castelnau and Gory)	5, 6
bella (LeConte)	6
bellula Dejean (not Mannerheim)	6
calcarata (Chevrolat)	5, 9
californica (Motschulsky)	13
chalybeitarsis Chevrolat	5
flexicaulis Schaeffer	5, 8
fulgurata Mannerheim	9
lebasi (Castelnau and Gory)	9
mendax Horn	5, 11
nobilis (Fabricius)	5
punctata (Melsheimer)	13
rugosula (Dejean)	13
simi Fisher	5, 15
sobrina Mannerheim	7
viridifasciata Chevrolat	5
ziczac Dejean	9
zigzag Dejean	9
Amblis Gistel	2, 3, 17
affinis (Fabricius)	2
chrysostigma (Linnaeus)	2, 3
nobilis (Fabricius)	2
Ancylochira Eschscholtz	2, 3
cupreus (Linnaeus)	2
flavomaculata (Fabricius)	2
haemorrhoidalis (Herbst)	2
octoguttata (Linnaeus)	2, 3
punctata (Fabricius)	2
rustica (Linnaeus)	2, 3
strigosa (author?)	2
Ancylochirini Mequingnon	3
Anoplis Kirby	3
rustica (Linnaeus)	3
Belionota auct. (not Eschscholtz)	4
calcarata Chevrolat	9
californica Motschulsky	13
Buprestis Linnaeus	2, 3
acornis Say	13
affinis Fabricius	2, 3
auriguttuta Sturm	6
characteristica Melsheimer	146
chrysoela Illiger	217
chrysostigma Linnaeus	2, 3
cupreus Linnaeus	2
dentipes Germar	146
excavata Olivier	198
femorata Olivier	133
flavomaculata Fabricius	2
haemorrhoidalis Herbst	2
harrisi Hentz	119
hybernata Fabricius	217
impressa Fabricius	2, 198
insculpta Herbst	133
nobilis Fabricius	5
octoguttata Linnaeus	2, 3
proxima Kirby	175
punctata Fabricius	2
punctata Melsheimer	13
quadrimaculata Melsheimer	224
ruficornis Sturm	146
rustica Linnaeus	2, 3
sexguttata Say	224
sexsignata Say	224
strangulata Harris	104
strigosa (author?)	2
tranquebarica Gmelin	198
trinervia Kirby	178
Buprestini Mequingnon	3
Carabus Geoffroy (not Linnaeus)	2
Chrysobothres LeConte	2
Chrysobothridae Castelnau and Gory	2
Chrysobothrides Duponchel	2
Chrysobothrini Stein	2
Chrysobothris Eschscholtz	1, 2, 3, 4, 5, 17
acacia Knull	23, 114
acornis (Say)	13
acuminata LeConte	28, 201
acutipennis auct. (not Chevrolat)	201
acutipennis Chevrolat	28, 203
adelpha Gemminger and Harold	24, 130
aegrota Dejean	103
aeneola auct. (not LeConte)	63
aeneola LeConte	21, 29, 65
aerea Horn (not Chevrolat)	195
affinis (Fabricius)	2, 3
alabamae Gory	133
alleni Cazier	29, 243
analis LeConte	28, 215
arizonica Chamberlin	20, 36
atabalipa auct. (not Castelnau and Gory)	78
atrifasciata LeConte	29, 235
atriplexae, new species	21, 45
auriguttata (Sturm)	6
auronota Castelnau and Gory	6
auronotata Castelnau and Gory	6
austinii Thomson	215
axillaris Horn	23, 112
azurea LeConte	28, 221
bacchari Van Dyke	21, 26, 61
bacchari auct. (not Van Dyke)	59
basalis LeConte	22, 78
beyeri Schaeffer	21, 26, 59
bicolor Horn	29, 244
biguttata Castelnau and Gory	103
bimarginicollis Schaeffer	28, 29, 219
biramosa (Fisher)	29, 233
bisinuata Chamberlin	21, 42
bispinosa Schaeffer	28, 211
blanchardi Horn	25, 163
boharti Van Dyke	20, 30, 32
breviloba Fall	27, 182
burkei Chamberlin	24, 139
calcarata Chamberlin	40
calcarata Melsheimer	128
californica auct. (not LeConte)	14, 170
californica LeConte	26, 167
canadensis Chamberlin	26, 165
carinipennis LeConte	27, 189
carmelita Fall	23, 108
caurina Horn	25, 27, 161
chalcophoroides auct. (not Horn)	119, 198
chalcophoroides Horn	28, 210
chalybeitarsis (Chevrolat)	5
chamberlini Fisher	21, 40
characteristica (Melsheimer)	146
chiricahuae Knull	23, 26, 122
chlorocephala Dejean	119
chrysoela (Illiger)	28, 29, 217
chrysostigma (Linnaeus)	2, 3
cicatricosa Motschulsky	178
coloradensis Wickham	250
concinnula LeConte	29, 226
consimilis Dejean	175
contigua LeConte	85
convexa Fall	29, 231
costifrons Waterhouse	28, 195
cribraria Dejean	133
cuprascens LeConte	22, 24, 86
cupreoaenea Castelnau and Gory	203
cupreohumeralis Van Dyke	21, 23, 68
cupreosignata Thomson	203
cyanella Horn	20, 30
debilis auct. (not LeConte)	70, 106
debilis LeConte	22, 23, 72
delecta Obenberger	38
deleta LeConte	21, 38
denticollis Gory	198

Page

Chrysobothris Eschscholtz—Continued.
denticulata Castelnau and Gory— 198
dentipes Castelnau and Gory— 133
dentipes (Germar) — 25, 146
deserta Horn — 21, 43
difficilis LeConte — 133
disjuncta LeConte — 72
dissimilis Dejean — 133
dolata Horn — 25, 148
edwardsii Horn — 22, 74
excavata (Olivier) — 198
exesa LeConte — 25, 143
falli Van Dyke — 27, 180
femorata auct. (not Olivier) — 128, 130, 131, 132
femorata (Olivier) — 24, 133
fiskei, new species — 28, 29, 221
floricola Gory — 23, 128
fragariae Fisher — 21, 49
fraterna Mannerheim — 198
fulgurata Mannerheim — 9
gahani Cockerell — 250
gemmata LeConte — 28, 207
germari Castelnau and Gory — 224
grandis Chamberlin — 25, 155
grindeliae Van Dyke — 21, 47
harrisi (Hentz) — 23, 24, 119
haydeni Scudder — 250
helferi, new species — 22, 26, 92
horni Kerremans — 249
hubbardi, new species — 26, 174
humilis Horn — 21, 23, 67
hybernata (Fabricius) — 217
ignicollis Horn — 22, 26, 94
ignipes Castelnau and Gory — 224
impressa (Fabricius) — 2, 198
insculpta (Herbst) — 133
iris Van Dyke — 22, 27, 99
juniperinus Chamberlin — 24, 137
kelloggi Knull — 23, 26, 125
laricis Van Dyke — 27, 184
lata Kerremans — 249
lateralis Waterhouse — 23, 106
lebasi Castelnau and Gory — 9
lecontei Leng — 221
lesueuri Castelnau and Gory — 133
libonoti Horn — 28, 193
lilaceous Chamberlin — 24, 136
lineatipennis auct. (not Van Dyke) — 59, 61
lineatipennis Van Dyke — 21, 26, 58
lixa Horn — 20, 34
lucana Horn — 29, 239
ludificata Horn — 25, 150
maculicornis Kerremans — 146
mali Horn — 21, 22, 26, 55
mellicula Dejean — 217
merkelii Horn — 28, 205
micromorpha Fall — 23, 123
misella LeConte — 133
monticola Fall — 25, 158
multistigmosa auct. (not Mannerheim) — 78
neopusilla, new species — 23, 25, 102
nigritula Castelnau and Gory — 133
nigrofasciata LeConte — 235
nixa Horn — 25, 156
obscura LeConte — 133
octocola LeConte — 22, 80
octopunctata Kunze — 81
oregona Chamberlin — 21, 53
orona Frost — 26, 172
parapiuta Knull — 23, 126
peninsularis Schaeffer — 22, 88
piuta Wickham — 23, 110
planata Castelnau and Gory — 146
planomarginata Chamberlin — 53
platti Cazier — 29, 241
plicata Dejean — 146

Page

Chrysobothris Eschscholtz—Continued.
posticalis Castelnau and Gory — 146
prasina Horn — 30, 247
prosopidis, new species — 22, 70
proxima (Kirby) — 175
pseudotsugae Van Dyke — 27, 191
pubescens auct. (not Fall) — 49
pubescens Fall — 21, 51
punctata (Melsheimer) — 13
purpurata Bland — 21, 63
purpureoplagiata Schaeffer — 23, 115
purpureovittata Horn — 23, 117
purpurifrons Motschulsky — 83
pusilla Castelnau and Gory — 23, 25, 103
quadriimpressa Castelnau and Gory — 133
quadrilineata LeConte — 25, 153
quadrimaculata (Melsheimer) — 224
rotundicollis Castelnau and Gory — 146
ruficornis (Sturm) — 146
rugosa Mannerheim — 198
rugosiceps Melsheimer — 24, 131
rugosula (Dejean) — 13
scabra Gory — 175
scabripennis Castelnau and Gory — 27, 175
schaefferi Obenberger — 22, 76
scitula auct. (not Gory) — 226
scitula Gory — 29, 229
scotti Chamberlin — 94
semisculpta Crotch — 133
semisculpta LeConte — 22, 24, 83
serripes Schaeffer — 28, 213
sexfasciata Schaeffer — 29, 230
sexguttata (Say) — 224
sexsignata (Say) — 28, 224
sierrae Van Dyke — 249
smaragdula Fall — 29, 246
socialis Waterhouse — 29, 237
soror LeConte — 130
speculifer Horn — 22, 27, 96
strangulata (Harris) — 104
subcylindrica Motschulsky — 38
subopaca Schaeffer — 24, 140
subpubescens Van Dyke — 51
suppressa Wickham — 250
sylvania Fall — 27, 187
texana LeConte — 22, 25, 90
thoracicus Schaeffer — 76
tranquebarica (Gmelin) — 28, 198
trinervia (Kirby) — 27, 178
ulkei LeConte — 29, 234
ultramarina Castelnau and Gory — 221
verdigripennis Frost — 24, 25, 141
viridiceps Melsheimer — 24, 132
viridicyanea Horn — 22, 23, 24, 100
viridipunctata Castelnau and Gory — 217
vulcanica LeConte — 26, 169
wickhami, new species — 28, 209
woodgatei Knull — 26, 171
Chrysobotris Eschscholtz — 2
Cicindela Geoffroy — 2
Colobogaster solier — 5
Cucujus Fabricius — 3
Cucujus Geoffroy — 2, 3
chrysostigma (Linnaeus) — 2, 3
Enocys Gistel — 17
Knowltonia Fisher — 17, 233
biramosa Fisher — 233
Odontomus Kirby — 3, 17
chrysostigma (Linnaeus) — 3
femorata (Olivier) — 133
proxima Kirby — 175
trinervia Kirby — 178
Porphyrus Des Gozis — 3
Trachypteris Melsheimer — 119
harrisii (Hentz) — 119
Trachys — 2

INDEX TO HOST PLANTS

Page

Abies balsamea 143
Abies concolor 150, 162, 193
Abies fraseri 103
Abies grandis 193
Acacia 68, 109
Acacia constricta 115
Acacia farnesiana 11, 82
Acacia felicioides 203
Acacia flexicaule 9
Acacia greggii 74, 145, 207, 216
Acer 223
Acer macrophyllum 56
Acer negundo 56, 135
Acer pseudoplatanus 56
Acer rubrum 14, 56, 133, 135, 226
Acer saccharinum 56, 135
Aesculus hippocastanum 56
Agave 235
Alder, black. *See* Common winterberry.
Alder, smooth (Alnus rugosa) 223
Alder, white (Alnus rhombifolia) 57
Alder-leaf mahogany (Cercocarpus alnifolius) 57
Alligator juniper (Juniperus pachyphloea) 87, 96
Almond (Prunus communis) 57
Alnus rhombifolia 57
Alnus rugosa 223
American elm (Ulmus americana) 56, 118, 135
Amygdalus persica 11, 57, 135, 217, 223
Antelope brush (Purshia tridentata) 111
Apple (Malus sp.) 57, 85, 135, 169, 188
Apricot (Prunus armeniaca) 57
Arbutus menziesii 57
Arctostaphylos tomentosa 56
Arizona cypress (Cupressus arizonica) 92
Ash, black (Fraxinus nigra) 226
Ash, European mountain (Sorbus aucuparia) 56
Ash, red (Fraxinus pennsylvanica) 135
Ash, white (Fraxinus americana) 226
Aspen (Populus tremuloides) 135
Atriplex 45, 237
Atriplex hymenelytra 46
Australian-pine (Casuarina equisetifolia) 200
Baccharis pilularis 59, 62
Baccharis sergiloides 59, 60
Bacchata (Zizyphus obtusifolia) 11
Baldcypress (Taxodium distichum) 7, 219, 226
Balsam fir (Abies balsamea) 143
Basswood (Tilia glabra) 223
Beech (Fagus sp.) 14, 143, 226
Beech, copper (Fagus sylvatica atropunicea) 56
Betula lenta 15
Betula lutea 226
Betula populifolia 223
Bigleaf maple (Acer macrophyllum) 56
Birch, gray (Betula populifolia) 223
Birch, sweet (Betula lenta) 15
Birch, white (Betula populifolia) 223
Birch, yellow (Betula lutea) 226
Black alder. *See* Common winterberry.
Black ash (Fraxinus nigra) 226
Black oak (Quercus velutina) 15
Black walnut (Juglans nigra) 135, 226
Blue gum (Eucalyptus globulus) 57
Blue spruce (Picea pungens) 152
Boxelder (Acer negundo) 56, 135
Broom, chaparral (Baccharis pilularis) 59, 62

Page

Brush, antelope (Purshia tridentata) 111
Brush, Jim (Ceanothus sorediatus) 57
Buckthorn, hollyleaf (Rhamnus crocea) 57
Buckwheat, wild (Eriogonum nudum) 31, 66
Bur oak (Quercus macrocarpa) 132
Butternut (Juglans cinerea) 226
Buttonwood (Conocarpus erecta) 200, 218
Cajanus indicus 7
California black oak (Quercus kelloggii) 56, 135
California juniper (Juniperus californica) 93, 154
California sycamore (Platanus racemosa) 56
Camperdown elm (Ulmus glabra camperdownii) 56
Canafistola (Cassia fistula) 200
Canotia 116
Canyon live oak (Quercus chrysolepis) 220
Cascara (Rhamnus purshiana) 57
Cassia covesii 241
Cassia fistula 200
Castanea dentata 132, 135, 226
Casuarina equisetifolia 200
Catclaw (Acacia constricta) 115
Catclaw (Acacia greggii) 74, 109, 145, 207, 216
Ceanothus cuneatus 41
Ceanothus sorediatus 57
Cedar, eastern red (Juniperus virginiana) 92
Cedar, incense (Libocedrus decurrens) 102, 158
Cedar, mountain (Juniperus mexicana) 96
Cedar, Port Orford (Chamaecyparis lawsoniana) 96, 102
Cedar, Rocky Mountain red (Juniperus scopulorum) 92, 96, 138
Celtis occidentalis 135
Celtis reticulata 74
Cercidium torreyanum 11, 71, 74, 82
Cercis japonica 135
Cercis reniformis 221
Cercocarpus alnifolius 57
Chamaecyparis lawsoniana 96, 102
Chaparral (Ceanothus cuneatus) 41
Chaparral broom (Baccharis pilularis) 59, 62
Chaparral pea (Pickeringia montana) 57
Cherry (Prunus sp.) 133
Cherry, hollyleaf (Prunus ilicifolia) 57
Cherry, Japanese flowering (Prunus serrulata) 57
Cherry, Japanese weeping (Prunus subhirtella Shidarehigan) 57
Cherry, sour (Prunus cerasus) 57
Cherry, sweet (Prunus avium) 57
Chestnut (Castanea dentata) 132, 135, 226
Chinese elm (Ulmus parvifolia) 135
Chinese wistaria (Wistaria sinensis) 57
Christmasberry (Photinia serrulata) 57
Coast live oak (Quercus agrifolia) 56, 85, 135, 241
Coffeeberry (Rhamnus purshiana) 57
Common winterberry (Ilex verticillata) 121
Coniferous trees 35
Conocarpus erecta 200, 218
Copper beech (Fagus sylvatica atropunicea 56

	Page
Cornus florida	223
Cornus paniculata	223
Cotoneaster horizontalis	57
Cottonwood, Eastern (Populus deltoides)	56
Crataegus	223
Crataegus carrierei	57
Cupressus	96
Cupressus arizonica	92
Cupressus macrocarpa	158
Currant, cultivated (Ribes rubrum)	57
Cydonia oblonga	57
Cypress (Cupressus sp.)	96
Cypress, Arizona (Cupressus arizonica)	92
Cypress, bald (Taxodium distichum)	7, 219, 226
Cypress, Monterey (Cupressus macrocarpa)	158
Desertholly (Atriplex hymenelytra)	46
Diospyros virginiana	219
Dogwood (Cornus florida)	223
Dogwood, gray (Cornus paniculata)	223
Douglas fir (Pseudotsuga taxifolia)	102, 150, 152, 162, 180, 184, 188, 191, 193
Eastern cottonwood (Populus deltoides)	56
Eastern hemlock (Tsuga canadensis)	105, 143, 177, 226
Eastern red cedar (Juniperus virginiana)	92
Ebony, Texas (Pithecolobium flexicaule)	9, 205
Elm, American (Ulmus americana)	56, 118, 135
Elm, Camperdown (Ulmus glabra camperdownii)	56
Elm, Chinese (Ulmus parvifolia)	135
Elm, Huntingdon (Ulmus hollandica vegeta)	56
Emory oak (Quercus emoryi)	74, 113, 197
English laurel (Prunus laurocerasus)	57
Ephedra	243
Eriobotrya japonica	57
Eriogonum nudum	31, 66
Eucalyptus globulus	57
European horsechestnut (Aesculus hippocastanum)	56
European mountainash (Sorbus aucuparia)	56
Fagus	226
Fagus grandifolia	14, 143
Fagus sylvatica atropunicea	56
Ficus	219
Fig (Ficus sp.)	219
Fir, Balsam (Abies balsamea)	143
Fir, Douglas (Pseudotsuga taxifolia)	102, 150, 152, 162, 180, 184, 188, 191, 193
Fir, lowland white (Abies grandis)	193
Fir, southern balsam (Abies fraseri)	103
Fir, white (Abies concolor)	150, 162, 193
Firethorn (Pyracantha coccinea)	57
Fouquieria splendens	76
Fragaria	50
Fraxinus americana	226
Fraxinus nigra	226
Fraxinus pennsylvanica	135
Geranium	54
Grape	223
Gray birch (Betula populifolia)	223
Gray dogwood (Cornus paniculata)	223
Greasewood	116
Grindelia robusta	48
Gum, blue (Eucalyptus globulus)	57
Gum, red (Liquidambar styraciflua)	135
Gumplant (Grindelia robusta)	48
Hackberry (Celtis occidentalis)	135
Hemlock, eastern (Tsuga canadensis)	105, 143, 177, 226
Hemlock, mountain (Tsuga mertensiana)	162, 193
Hickory (Hicoria sp.)	11, 15, 131, 223, 226
Hicoria pecan	131, 216
Highland live oak (Quercus wislizenii)	135
Holly, desert (Atriplex hymenelytra)	46
Hollyleaf buckthorn (Rhamnus crocea)	57
Hollyleaf cherry (Prunus ilicifolia)	57
Honey mesquite (Prosopis juliflora glandulosa)	73
Horsebean	11, 90, 216
Horsechestnut, European (Aesculus hippocastanum)	56
Huisache (Acacia farnesiana)	11, 82
Huntingdon elm (Ulmus hollandica vegeta)	56
Ilex verticillata	121
Incense cedar (Libocedrus decurrens)	102, 158
Ivy, poison (Rhus toxicodendron)	223
Japanese flowering cherry (Prunus serrulata)	57
Japanese redbud (Cercis japonica)	135
Japanese weeping cherry (Prunus subhirtella Shidarehigan)	57
Jatropha multifida	35, 69
Jeffrey pine (Pinus jeffreyi)	52, 85, 102, 140, 150, 156, 160, 162, 169, 182, 193
Jim brush (Ceanothus sorediatus)	57
Juglans cinerea	226
Juglans nigra	135, 226
Juniper (Juniperus sp.)	37, 93, 98, 100
Juniper, alligator (Juniperus pachyphloea)	87, 96
Juniper, California (Juniperus californica)	93, 154
Juniper, one-seed (Juniperus monosperma)	96
Juniper, Utah (Juniperus utahensis)	92, 96
Juniper, western (Juniperus occidentalis)	102, 137, 138, 158
Juniperus	37, 93, 98, 100
Juniperus californica	93, 154
Juniperus mexicana	96
Juniperus monosperma	96
Juniperus occidentalis	102, 137, 138, 158
Juniperus pachyphloea	87, 96
Juniperus scopulorum	92, 96, 138
Juniperus utahensis	92, 96
Juniperus virginiana	92
Knobcone pine (Pinus attenuata)	140
Larch, western (Larix occidentalis)	162, 186, 191
Larix laricina	148, 165, 226
Larix occidentalis	162, 186, 191
Laurel, English (Prunus laurocerasus)	57
Libocedrus decurrens	102, 158
Limber pine (Pinus flexilis)	152, 180, 184
Lime	205
Linden (Tilia glabra)	223
Liquidambar styraciflua	135
Loblolly pine (Pinus taeda)	130
Lodgepole pine (Pinus contorta)	85, 148, 150, 160, 182, 184, 191
Lodgepole pine (Pinus contorta murrayana)	186
Loganberry (Rubus loganobaccus)	57
Lombardy poplar (Populus nigra italica)	56
Longleaf pine (Pinus palustris)	130, 148
Loquat (Eriobotrya japonica)	57
Lowland white fir (Abies grandis)	193
Lysiloma latisiliqua	7
Madroña (Arbutus menziesii)	57
Mahogany, alderleaf (Cercocarpus alnifolius)	57
Malus	57, 85, 135, 169, 188
Mangrove, red (Rhizophora mangle)	200
Manzanita (Arctostaphylos tomentosa)	56
Maple (Acer sp.)	223
Maple, bigleaf (Acer macrophyllum)	56
Maple, red (Acer rubrum)	14, 56, 133, 135, 226

Page

Maple, silver (Acer saccharinum) 56, 135
Maple, sycamore (Acer pseudoplatanus) 56
Mesquite (Prosopis juliflora) 12, 39, 40, 57, 71, 73, 74, 82, 107, 145, 207, 209
Mesquite, honey (Prosopis juliflora glandulosa) 73
Mexican blue oak (Quercus oblongifolia) 195
Meyer's globular-headed willow (Salix matsudana umbraculifera) 56
Mimosa 68
Mimosa lindheimeri 216
Monterey cypress (Cupressus macrocarpa) 158
Mountainash (Sorbus sp.) 135
Mountainash, European (Sorbus aucuparia) 56
Mountain cedar (Juniperus mexicana) 96
Mountain hemlock (Tsuga mertensiana) 162, 193
Myrica cerifera 219
Myrobalan plum (Prunus cerasifera) 57
Myrtle, wax (Myrica cerifera) 219
Northern white pine (Pinus strobus) 105, 121, 130, 148, 165, 177, 180
Norway spruce (Picea abies) 143
Oak 113, 135, 148, 219
Oak, black (Quercus velutina) 15
Oak, bur (Quercus macrocarpa) 132
Oak, California (Quercus kelloggii) 56, 135
Oak, canyon live (Quercus chrysolepis) 220
Oak, coast live (Quercus agrifolia) 56, 85, 135, 241
Oak, Emory (Quercus emoryi) 74, 113, 197
Oak, highland live (Quercus wislizenii) 135
Oak, Mexican blue (Quercus oblongifolia) 195
Oak, pin (Quercus sp.) 135
Oak, pin (Quercus minor) 228
Oak, post (Quercus stellata) 226, 228
Oak, red (Quercus sp.) 133
Oak, Rocky Mountain white (Quercus utahensis) 113, 152, 214
Oak, scarlet (Quercus coccinea) 223
Oak, scrub (Quercus dumosa) 52
Oak, swamp white (Quercus bicolor) 223, 226
Oak, valley white (Quercus lobata) 135
Oak, white (Quercus sp.) 11
Oak, white (Quercus alba) 132, 135, 209, 226
Oak, white (Quercus arizonica) 113, 197, 211
Oak, willow (Quercus laurifolia) 135
Ocotillo 76
One-seed juniper (Juniperus monosperma) 96
Orange 205
Oriental plane (Platanus orientalis) 56
Osmaronia cerasiformis 57
Osoberry (Osmaronia cerasiformis) 57
Pacific plum (Prunus subcordata) 57
Palo blanco (Celtis reticulata) 74
Palo verde (Cercidium torreyanum) 11, 71, 74, 82
Parkinsonia 11, 90
Parkinsonia aculeata 216
Parry piñon (Pinus parryana) 148
Pea, chaparral (Pickeringia montana) 57
Peach (Amygdalus persica) 11, 57, 135, 217, 223
Pecan (Hicoria pecan) 131, 216
Persimmon (Diospyros virginiana) 219
Photinia serrulata 57
Picea 105, 177, 180
Picea abies 143
Picea glauca 105, 143
Picea pungens 152
Pickeringia montana 57
Pin oak (Quercus sp.) 135
Pin oak (Quercus minor) 228
Pine (Pinus sp.) 15, 123, 143, 223

Page

Pine, Jeffrey (Pinus jeffreyi) 52, 85, 102, 140, 150, 156, 160, 162, 169, 182, 193
Pine knob-cone (Pinus attenuata) 140
Pine, limber (Pinus flexilis) 152, 180, 184
Pine, loblolly (Pinus taeda) 130
Pine, lodgepole (Pinus contorta) 84, 148, 150, 160, 182, 184, 191
Pine, lodgepole (Pinus contorta murrayana) 186
Pine, longleaf (Pinus palustris) 130, 148
Pine, northern white (Pinus strobus) 105, 121, 130, 148, 165, 177, 180
Pine, pitch (Pinus rigida) 105, 121, 130, 165, 226
Pine, shortleaf (Pinus echinata) 105, 148
Pine, singleleaf (Pinus monophylla) 87
Pine, sugar (Pinus lambertiana) 85, 150, 162, 191
Pine, Virginia (Pinus virginiana) 121, 148, 165
Pine, Western white (Pinus monticola) 160
Pine, western yellow (Pinus ponderosa) 31, 40, 52, 82, 87, 148, 150, 152, 154, 160, 162, 169, 180, 182, 184, 191, 193
Piñon (Pinus edulis) 152, 180, 184, 191
Piñon, Parry (Pinus parryana) 148
Pinus 15, 123, 143, 223
Pinus attenuata 140
Pinus contorta 85, 148, 150, 160, 182, 184, 191
Pinus contorta murrayana 186
Pinus echinata 105, 148
Pinus edulis 152, 180, 184, 191
Pinus flexilis 152, 180, 184
Pinus jeffreyi 52, 85, 102, 140, 150, 156, 160, 162, 169, 182, 193
Pinus lambertiana 85, 150, 162, 191
Pinus monophylla 87
Pinus monticola 160
Pinus palustris 130, 148
Pinus parryana 148
Pinus ponderosa 31, 40, 52, 85, 87, 148, 150, 152, 154, 160, 162, 169, 180, 182, 184, 191, 193.
Pinus rigida 105, 121, 130, 165, 226
Pinus strobus 105, 121, 130, 148, 165, 177, 180
Pinus taeda 130
Pinus virginiana 121, 148, 165
Pitch pine (Pinus rigida) 105, 121, 130, 165, 226
Pithecolobium flexicaule 9, 205
Plane, Oriental (Platanus orientalis) 56
Platanus occidentalis 135
Platanus orientalis 56
Platanus racemosa 56
Plum (Prunus domestica) 57, 118, 135, 223
Plum, Myrobalan (Prunus cerasifera) 57
Plum, Pacific (Prunus subcordata) 57
Poison ivy (Rhus toxicodendron) 223
Poplar, Lombardy (Populus nigra italica) 56
Populus deltoides 56
Populus nigra italica 56
Populus tremuloides 135
Port Orford cedar (Chamaecyparis lawsoniana) 96, 102
Post oak (Quercus stellata) 226, 228
Prosopis juliflora 12, 39, 40, 57, 71, 73, 74, 82, 107, 145, 207, 209
Prosopis juliflora glandulosa 73
Prunus 133
Prunus armeniaca 57
Prunus avium 57
Prunus cerasifera 57
Prunus cerasus 57
Prunus communis 57
Prunus domestica 57, 118, 135, 223
Prunus ilicifolia 57
Prunus laurocerasus 57
Prunus serrulata 57
Prunus subcordata 57

	Page
Prunus subhirtella Shidarehigan	57
Pseudotsuga taxifolia	102, 150, 152, 162, 180, 184, 188, 191, 193
Purshia tridentata	111
Pyracantha coccinea lalandii	57
Quercus	11, 113, 133, 135, 148, 219
Quercus agrifolia	56, 85, 135, 241
Quercus alba	132, 135, 209, 226
Quercus arizonica	113, 197, 211
Quercus bicolor	223, 226
Quercus chrysolepis	220
Quercus coccinea	223
Quercus dumosa	52
Quercus emoryi	74, 113, 197
Quercus gambelii	113
Quercus kelloggii	56, 135
Quercus laurifolia	135
Quercus lobata	135
Quercus macrocarpa	132
Quercus minor	228
Quercus oblongifolia	195
Quercus stellata	226, 228
Quercus utahensis	113, 152, 214
Quercus velutina	15
Quercus wislizenii	135
Quince (Cydonia oblonga)	57
Raphiolepis japonica	57
Red ash (Fraxinus pennsylvanica)	135
Redbud, Japanese (Cercis japonica)	135
Redbud, Texas (Cercis reniformis)	221
Red gum (Liquidambar styraciflua)	135
Red mangrove (Rhizophora mangle)	200
Red maple (Acer rubrum)	14, 56, 133, 135, 226
Red oak (Quercus sp.)	133
Red willow (Salix laevigata)	56
Rhamnus crocea	57
Rhamnus purshiana	57
Rhizophora mangle	200
Rhus glabra	223
Rhus toxicodendron	223
Ribes rubrum	57
Rocky Mountain red cedar (Juniperus scopulorum)	92, 96, 138
Rocky Mountain white oak (Quercus utahensis)	113, 152, 214
Rose (Rosa sp.)	57
Rubus loganobaccus	57
Salix	60, 223
Salix babylonica	56
Salix laevigata	56
Salix lasiolepis	56, 135
Salix matsudana umbraculifera	56
Scarlet oak (Quercus coccinea)	223
Scrub oak (Quercus dumosa)	52
Senna (Cassia covesii)	241
Shortleaf pine (Pinus echinata)	105, 148
Silver maple (Acer saccharinum)	56, 135
Singleleaf pine (Pinus monophylla)	87
Smooth alder (Alnus rugosa)	223
Smooth sumac (Rhus glabra)	223
Sorbus	135
Sorbus aucuparia	56
Sour cherry (Prunus cerasus)	57
Southern balsam fir (Abies fraseri)	103
Spruce (Picea sp.)	105, 177, 180
Spruce, blue (Picea pungens)	152
Spruce, Norway (Picea abies)	143
Spruce, white (Picea glauca)	105, 143
Strawberry (Fragaria sp.)	50
Sugar pine (Pinus lambertiana)	85, 150, 162, 191
Sumac, smooth (Rhus glabra)	223
Swamp white oak (Quercus bicolor)	223, 226
Sweet birch (Betula lenta)	15
Sweet cherry (Prunus avium)	57
Sycamore (Platanus occidentalis)	135
Sycamore, California (Platanus racemosa)	56
Sycamore maple (Acer pseudoplatanus)	56
Tamarack (Larix laricina)	148, 165, 226
Taxodium distichum	7, 219, 226
Texas ebony (Pithecolobium flexicaule)	9, 205
Texas redbud (Cercis reniformis)	221
Thorn (Crataegus sp.)	223
Thorn (Crataegus carrierei)	57
Tilia glabra	223
Trailing cotoneaster (Cotoneaster horizontalis)	57
Tsuga canadensis	105, 143, 177, 226
Tsuga mertensiana	162, 193
Ulmus americana	56, 118, 135
Ulmus glabra camperdownii	56
Ulmus hollandica vegeta	56
Ulmus parvifolia	135
Utah juniper (Juniperus utahensis)	92, 96
Valley white oak (Quercus lobata)	135
Vauquelinia californica	96, 107
Virginia pine (Pinus virginiana)	121, 148, 165
Walnut, black (Juglans nigra)	135, 226
Wax myrtle (Myrica cerifera)	219
Weeping willow (Salix babylonica)	56
Western juniper (Juniperus occidentalis)	102, 137, 138, 158
Western larch (Larix occidentalis)	162, 186, 191
Western white pine (Pinus monticola)	160
Western yellow pine (Pinus ponderosa)	31, 40, 52, 85, 87, 148, 150, 152, 154, 160, 162, 169, 180, 182, 184, 191, 193
White alder (Alnus rhombifolia)	57
White ash (Fraxinus americana)	226
White birch (Betula populifolia)	223
White fir (Abies concolor)	150, 162, 193
White oak (Quercus sp.)	11
White oak (Quercus alba)	132, 135, 209, 226
White oak (Quercus arizonica)	113, 197, 211
White spruce (Picea glauca)	105, 143
White willow (Salix lasiolepis)	56, 135
Wild buckwheat (Eriogonum sp.)	31, 66
Wild buckwheat (Eriogonum nudum)	31
Willow (Salix sp.)	60, 223
Willow, Meyer's globular-headed (Salix matsudana umbraculifera)	56
Willow, red (Salix laevigata)	56
Willow, weeping (Salix babylonica)	56
Willow, white (Salix lasiolepis)	56, 135
Willow oak (Quercus laurifolia)	135
Winterberry, common (Ilex verticillata)	121
Wisteria chinensis	223
Wisteria sinensis	57
Yellow birch (Betula lutea)	226
Zizyphus obtusifolia	11

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